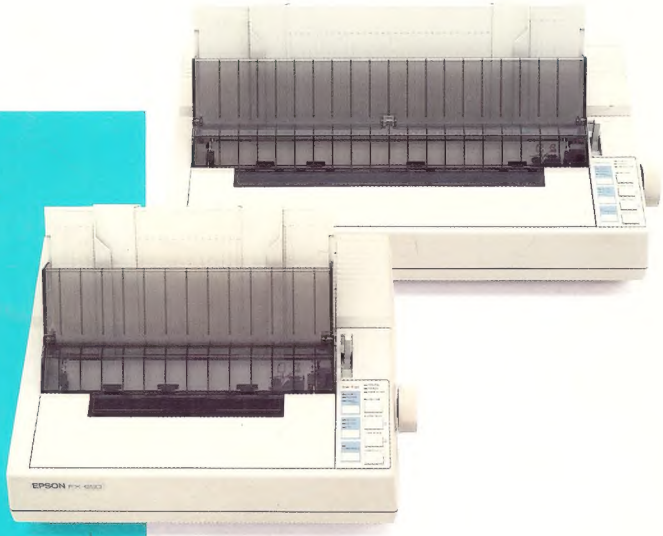
FX-850/1050

User's Guide



EPSON

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EPSON

FX-850/1050

User's Guide

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About this Guide

This User's Guide provides fully-illustrated, step-by-step instructions on setting up and operating the FX-850 and FX-1050 printers.

Finding your way around

- Chapter 1 contains information on unpacking, setting up, testing, and connecting the printer, so be sure to read and follow the instructions in this chapter first. Inside the back flap of the guide are illustrations of the printer in which all of the major parts are identified.
- Chapters 2 and 3 include important information on paper handling and general printer operation. This information is necessary for the day-to-day operation of your printer.
- Chapter 4 contains information designed to help you get the most from your printer. This section includes advice on the use of software commands, graphics, and user-defined characters. Also see Chapter 10 for a summary of printer commands.
- If the printer does not operate properly or the printed results are not what you expect, see Chapter 7 for a list of check points and recommended solutions.
- Other chapters contain information on general maintenance, use of the printer options, and specifications. You will also find a glossary of printer terms and an index.
- At the back of this Guide is a Quick Reference Card with the information you are most likely to need.

The FX-850 and FX-1050 are basically the same printer except that the FX-1050 can accept wider paper. Therefore, the illustrations in this guide show only the FX-1050.

Conventions used in this guide

Warnings must be followed carefully to avoid damage to your printer and computer.

Cautions should be followed carefully to ensure that your printer operates correctly.

Notes contain important information and useful tips on the operation of your printer.

Introduction

The FX-850 and FX-1050 are the newest in Epson's line of advanced 9-pin impact dot matrix printers, combining a compact design and high performance with a wide range of features.

Features

In addition to the high-quality printing and ease of operation you have come to expect from Epson printers, the FX-850 and FX-1050 offer the following:

- Compatibility with the EPSON ESC/P commands used by previous 9-pin EPSON printers.
- Easy paper handling, featuring automatic single sheet loading.
- High-speed draft printing (10 cpi) at 290 characters per second.
- An improved control panel design that allows direct selection of character fonts and pitch, as well as a choice of normal or condensed printing.
- Two built-in Near Letter Quality fonts (Roman and Sans Serif) for producing high-quality documents.
- An advanced paper handling system that lets you use single sheets of paper without removing the continuous paper. This system allows you to use continuous paper even while the optional cut sheet feeder is installed.
- A new short tear-off feature that saves paper. When a sheet of continuous paper is torn off at the end of a printout, the printer reverse-feeds the remaining paper so that printing can begin at the top of the next sheet.
- A micro-adjustment feature that allows you to feed the paper forward or backward to finely adjust the loading and short tear-off positions.

- The selection of one of thirteen international character sets, and a choice of either an italics character table or the Epson Extended Graphics character table.

- The ability to handle a wide range of paper types. The optional cut sheet feeder can automatically feed single sheets as well as envelopes. A double-bin cut sheet feeder is also available.

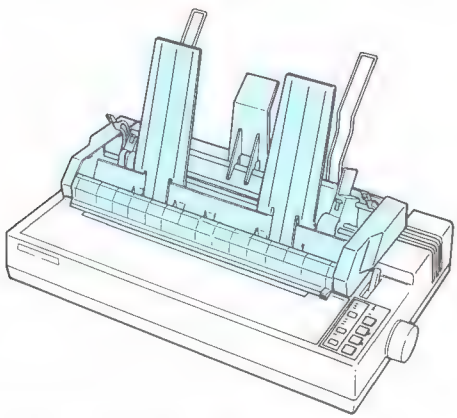
- An IBM emulation mode that provides compatibility with many application programs written for popular IBM printers.

- Reduced noise levels.

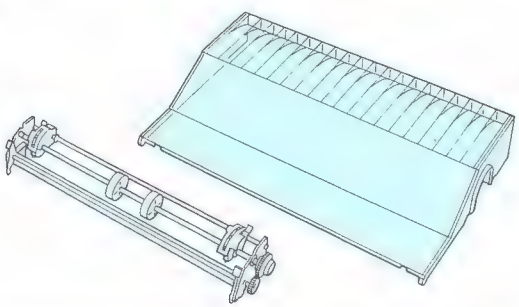
Options

A variety of printer options are available for use with your FX-850 or FX-1050 printer. For detailed information on the installation and use of these options, see Chapter 5.

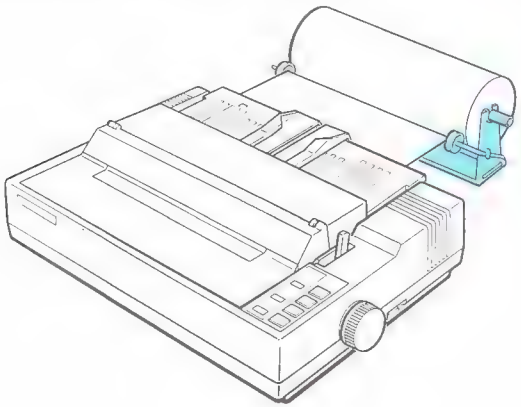
- **Single-Bin and Dual-Bin Cut Sheet Feeders (#7339/#7340/#7346/#7348)**
  The cut sheet feeder makes it possible to handle single sheet paper more easily and more efficiently. Up to 150 sheets of standard bond paper can be automatically fed into the printer without reloading. This unit can also feed envelopes.



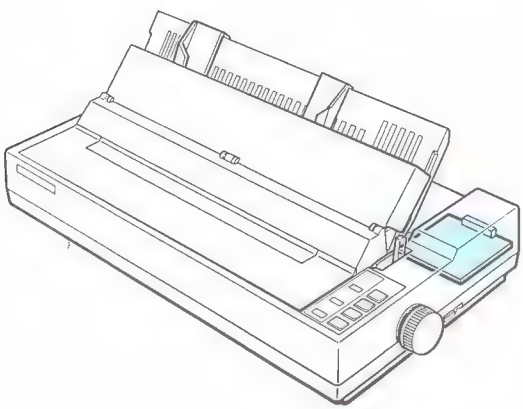
- **Pull Tractor Unit (#7311/#7312)**
  This option improves the performance of continuous paper handling. It is especially useful with continuous multi-part forms.



- **Roll Paper Holder (#8310)**
  Available only for the FX-850, the optional roll paper holder makes it possible to use the many types of 8.5-inch wide roll paper sold for telexes and similar machines.



- **Interface Boards**
  Optional interface boards are available to supplement the printer's built-in parallel interface.
  Guidelines for choosing the right interface and instructions on installing the boards are given in Chapter 5.



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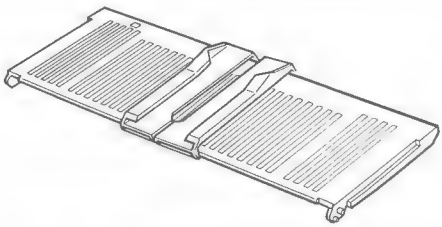
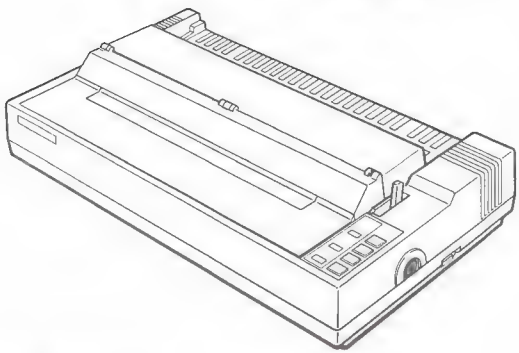
Unpacking the Printer

Checking the parts

When you unpack the printer, make sure that you have all the parts shown below and that none have been damaged during transportation.

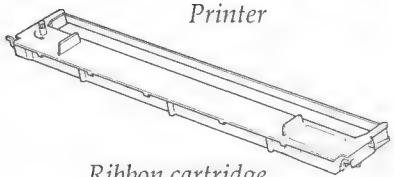


Paper guide



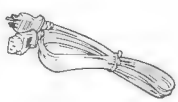
Printer

Cross-head screwdriver



Ribbon cartridge

Platen knob



Power cable

In some locations, the power cable may be attached to the printer.

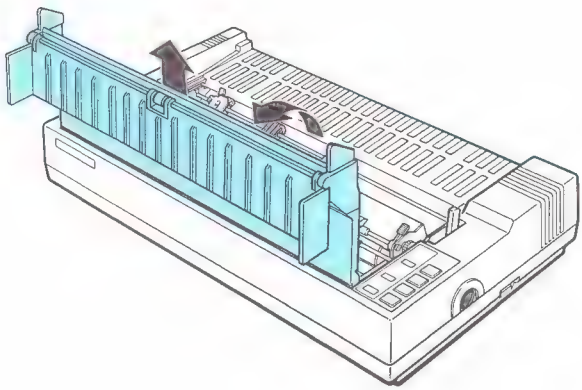
There are several different versions of the printer designed for different electrical standards. The power supply voltage is shown on the label on the back of the printer. If voltage shown is not the correct voltage for your country, contact your dealer. It is not possible to adjust the printer for use on another voltage.

After removing the parts, save the packaging materials in case you ever need to transport your printer.

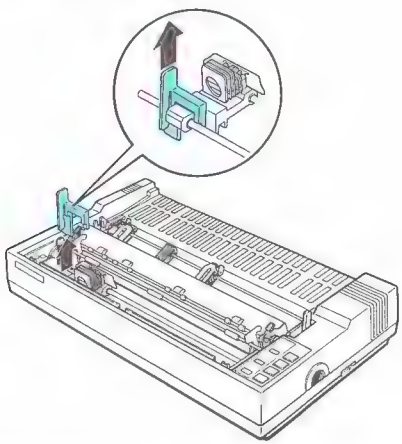
Removing the protective materials

The printer is protected during shipping by two locking tabs and a print head protector. These protective items must be removed before you turn on the printer. After removing these items, store them with the other packaging material in case you ever need to transport your printer.

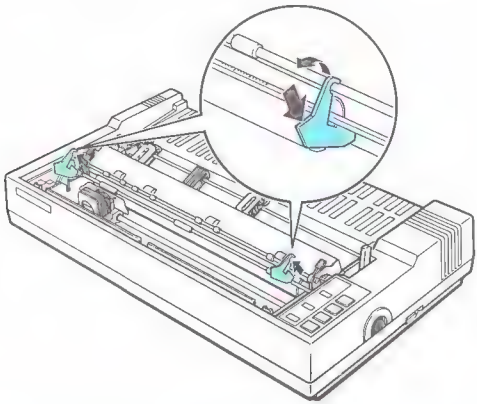
1. Remove the printer cover.



2. Remove the print head protector.

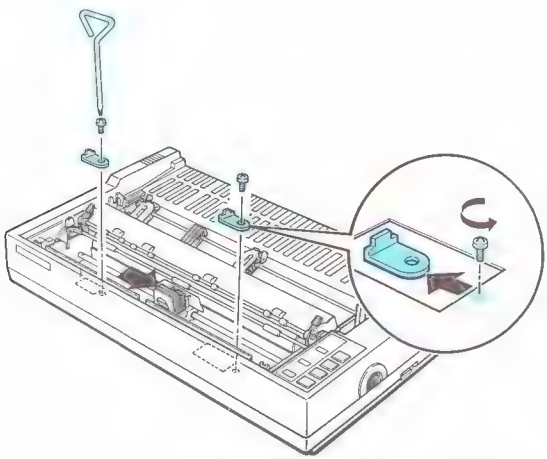


3. Remove the left and right locking tabs.



Be sure to remove all protective materials before you turn on the printer.

4. Slide the print head to the middle of the printer. Then, use the enclosed cross-head screwdriver to unscrew and remove the two transport locking brackets.

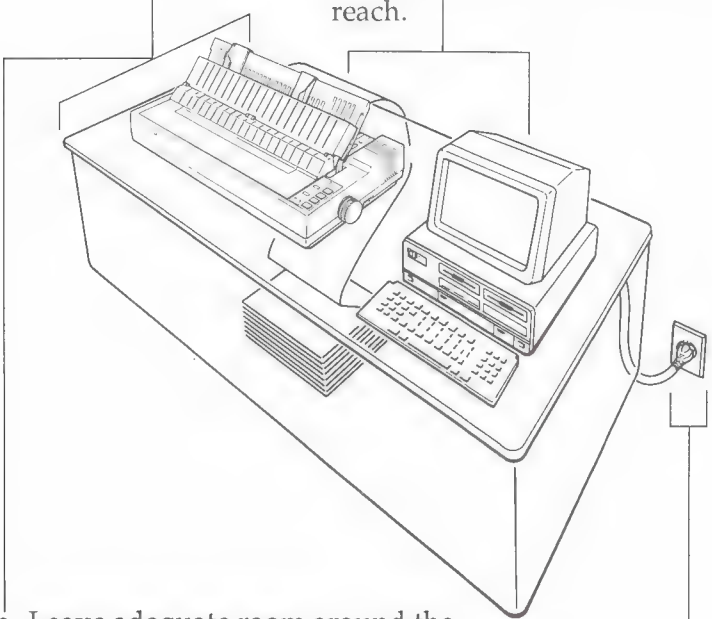


Choosing a Place for the Printer

There are several important things to consider when selecting a location for your printer. Be sure to keep the following in mind:

The illustration below shows a good printer location.

- Place the printer on a flat, stable surface.
- Place the printer close enough to the computer for the printer cable to reach.



- Leave adequate room around the printer to allow easy printer operation and maintenance.
- Use a grounded outlet; do not use an adapter plug.

- Avoid locations that are subject to direct sunlight, excessive heat, moisture, or dust.
- Avoid using electrical outlets that are controlled by wall switches or automatic timers. Accidental disruption of power can wipe out information in your computer's and printer's memory.
- Avoid using outlets on the same circuit with large motors or electrical appliances that might cause fluctuations in line voltage.
- Keep the entire computer system away from potential sources of electromagnetic interference such as loudspeakers or the base units of cordless telephones.

If you plan to use a printer stand, read through the list of requirements and suggestions below to ensure that you have the right stand for your printer.

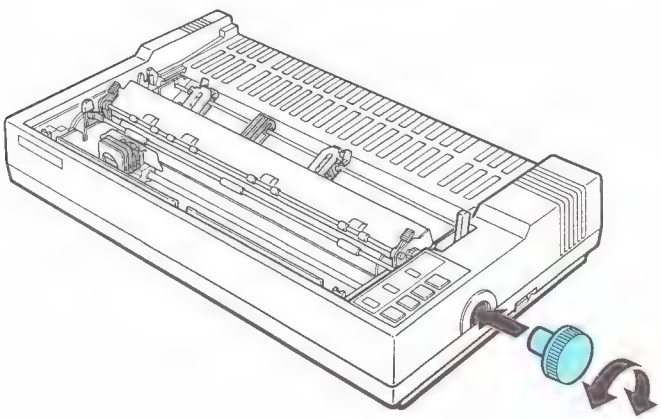
- The stand should be able to support at least twice the weight of the FX-850 (approx. 9.5 kg) / FX-1050 (approx. 12.5 kg).
- Never use a stand that supports the printer at an angle of more than 15° degrees from horizontal.
- With the cut sheet feeder installed, your printer should be kept level at all times.
- If your paper supply is positioned below the printer stand, make sure that there is enough clearance to keep the paper from catching on the underside of the stand. Also, check to see that the distance between the stand supports is wide enough to accommodate the paper you will be using. (See the illustrations on page 1-6.)
- Position your printer's power cable and interface cable so that they do not interfere with paper feeding. If possible, secure the cables to the printer stand support.

Installing the platen knob

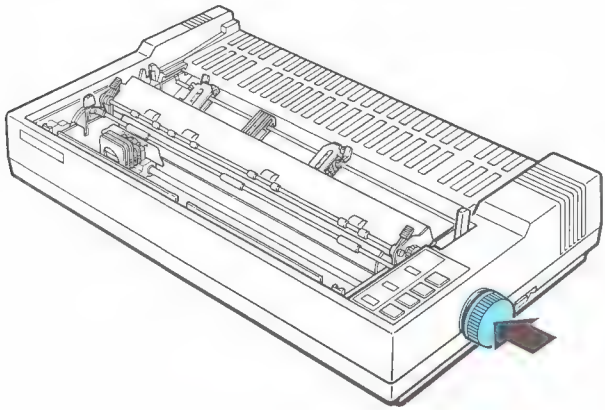
After you've decided on a location for your printer, the first step in setting it up is to install the platen knob. The platen knob is used to manually feed the paper in the event of a paper jam or other paper feeding problem.

You will find the platen knob packed in an indentation in the white foam packaging material.

1. Insert the knob into the hole on the printer's side and rotate it slowly until it slips onto the half-round shaft.



2. Push firmly on the knob and push it onto the shaft as far as it will go.

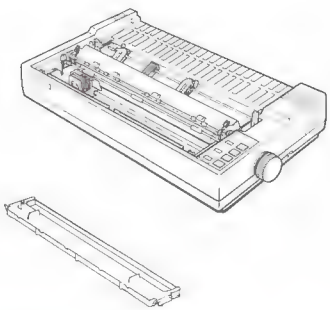


Using the platen knob to adjust the position of the paper interferes with the automatic paper loading system and may cause a paper jam.

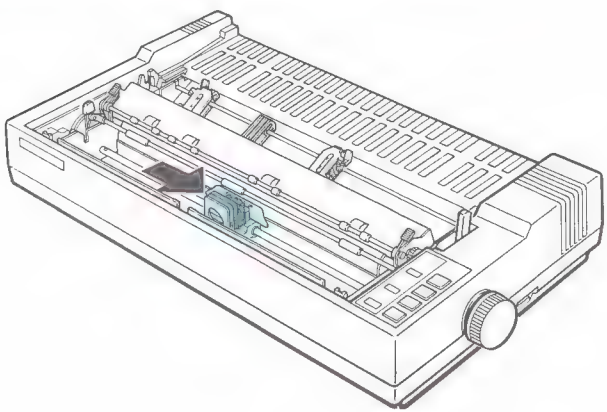
Installing the ribbon cartridge

Your printer's ribbon cartridge is designed to allow easy installation and removal. Before installing the ribbon cartridge, make sure that the printer is not connected to an electrical outlet. Install the ribbon cartridge as follows.

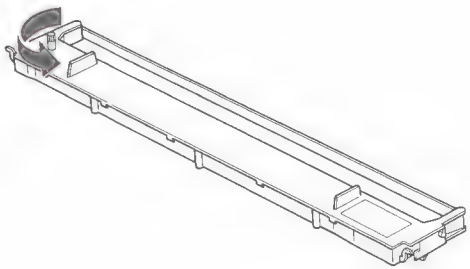
Make sure that all protective materials are removed.



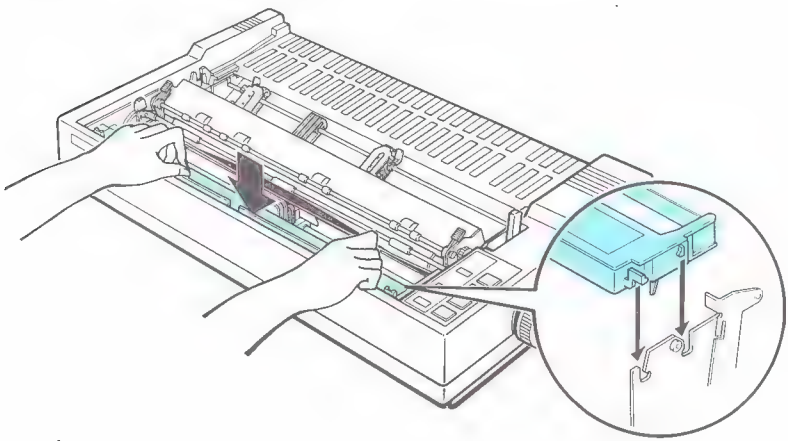
1. Slide the print head to the middle of the printer.



2. Turn the ribbon-tightening knob in the direction of the arrow. This removes excess slack in the ribbon and makes it easier to install.

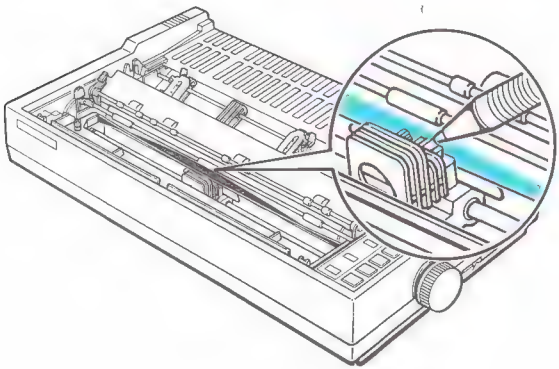


3. Hold the ribbon cartridge by its handle(s) and push it firmly down into position, making sure the plastic hooks fit into the printer.

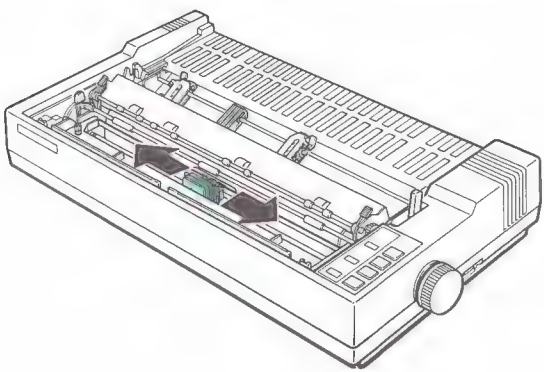


Press lightly on both ends of the cartridge to make sure the plastic hooks are properly seated in the metal slots.

4. Use a pointed object, such as a pencil, to guide the ribbon between the print head and ribbon guide while you turn the ribbon-tightening knob to help feed the ribbon into place.



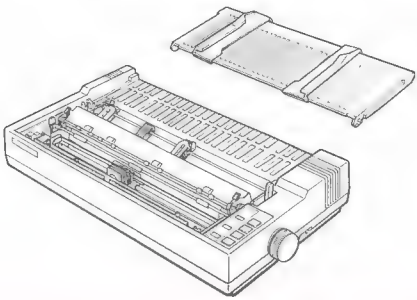
5. Slide the print head from side to side to make sure that it moves smoothly. Also check that the ribbon is neither twisted nor creased.



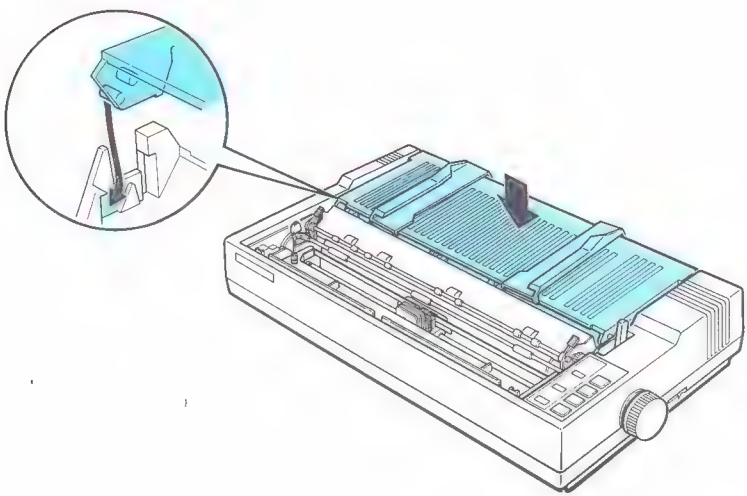
Attaching the paper guide

The paper guide functions to feed the paper smoothly and efficiently.

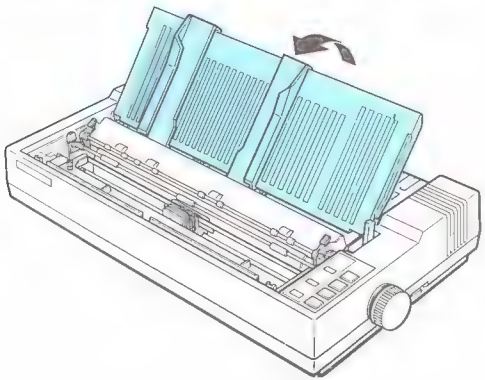
Make sure that the platen knob and ribbon are installed before installing the paper guide.



1. Place the paper guide on the printer as shown.

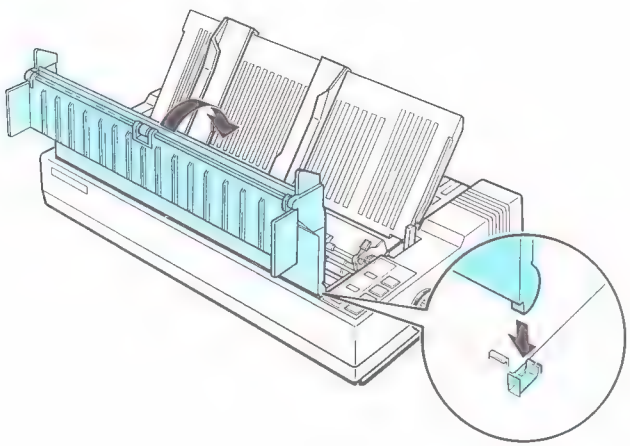


2. Raise the paper guide until it locks into place.

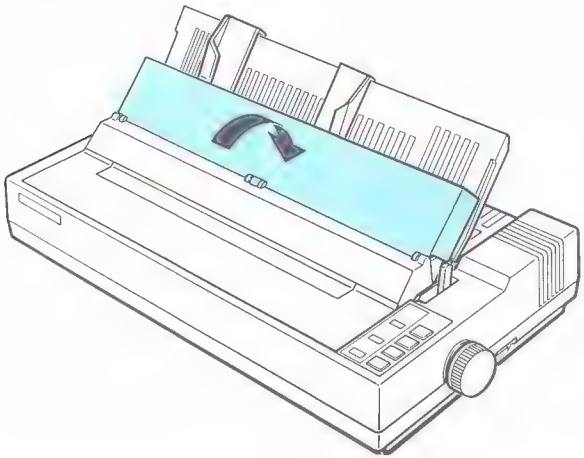


To lower the paper guide, lift up slightly to release it from its locked position and gently lower it down onto the printer.

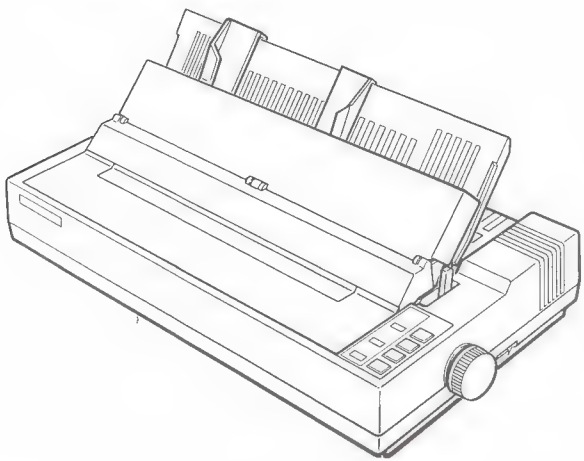
3. Attach the printer cover. Make sure that the projections on the cover fit into the notches at the front of the printer; then tilt the cover back into place.



4. Close the paper guide cover.



Assembly of the printer is now completed.



Testing the Printer

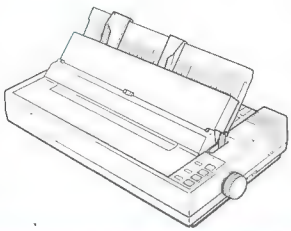
Now that your printer is fully assembled, you can use the built-in self test function to see that the printer is working correctly even though it is not connected to a computer. You should perform this test to make sure that your printer was not damaged during shipping and to ensure that the ribbon is correctly installed.

Before running the self test, you need to apply power to your printer.

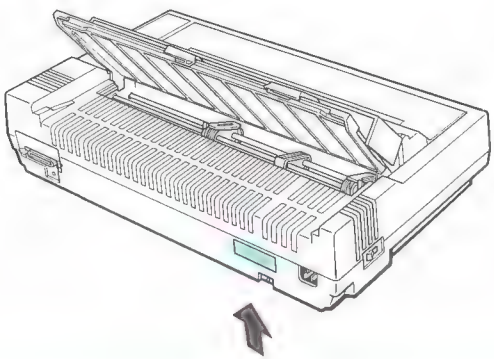
Connecting to a power supply

Before plugging in your printer, make sure that:

- The platen knob is installed.
- The ribbon cartridge is installed.
- The paper guide is attached.
- The printer cover is attached.
- The power switch is in the off position.

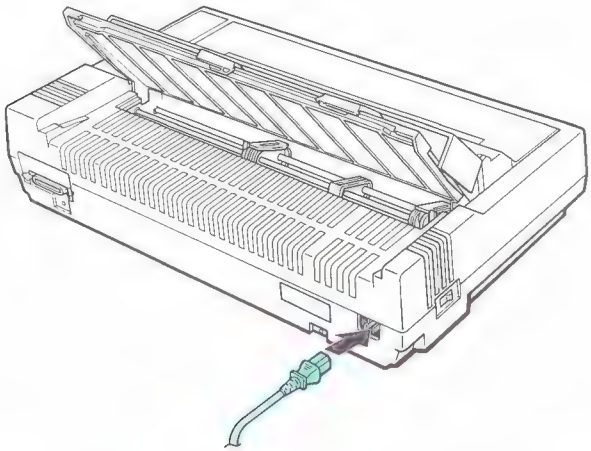


1. Check the label on the back of the printer to make sure the power rating required by the printer matches that of your electrical outlet.

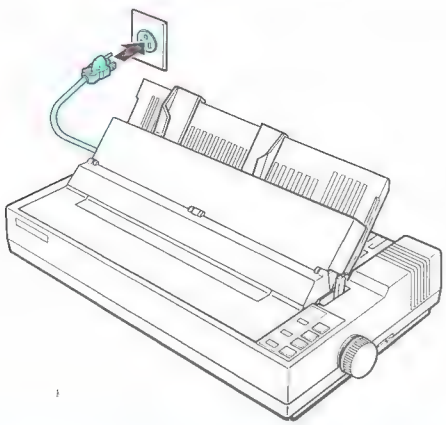


If the rated voltage and your outlet voltage do not match, contact your nearest Epson dealer for assistance. Do not plug in the power cable.

2. Connect the power cable to the AC inlet on the printer's rear panel.



3. Plug the power cable into a properly grounded electrical outlet.



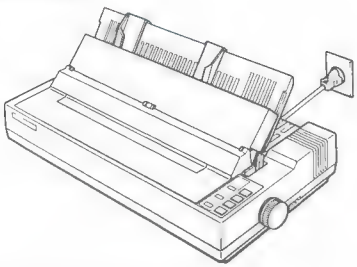
After turning the power off, always wait at least five seconds before turning it back on. Rapid switching of the power on and off can damage the printer.

Running the self test

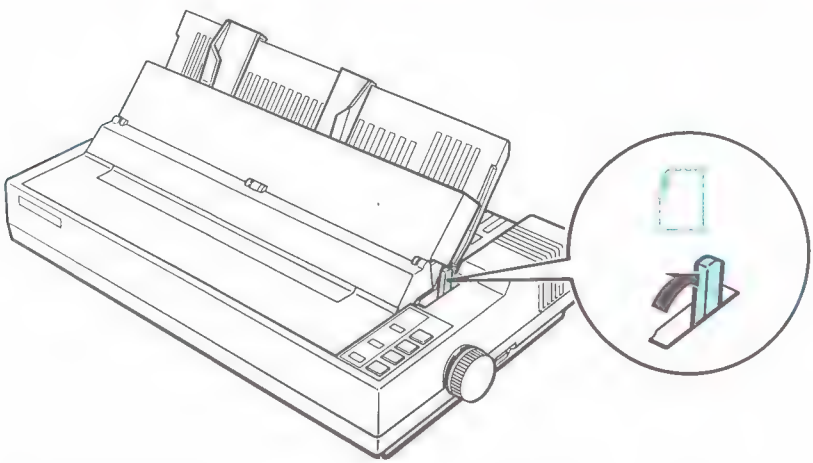
The self test can be run in the high speed draft mode, the normal draft mode, or the Near Letter Quality mode.
Procedures for using the three modes are the same, except that different buttons are pressed at step 2 (see below).

Before running the self test, make sure that:

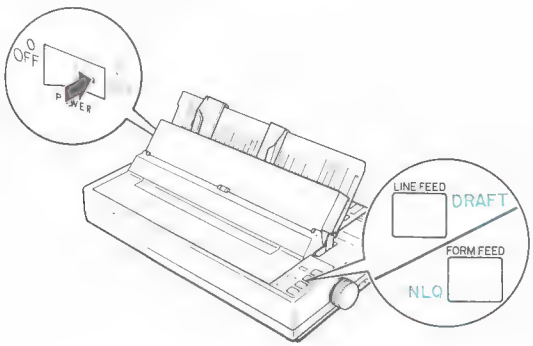
- The printer is turned off.
- All protective materials have been removed.



1. Push the paper release lever back to the single sheet position.

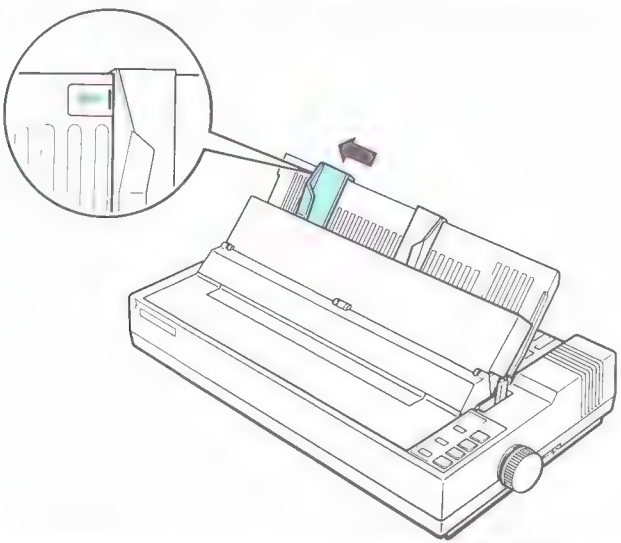


2. While holding down the LINE FEED button (normal and high speed draft mode) or FORM FEED button (NLQ mode), turn on the printer. The printer beeps repeatedly and the POWER and PAPER OUT lights come on.

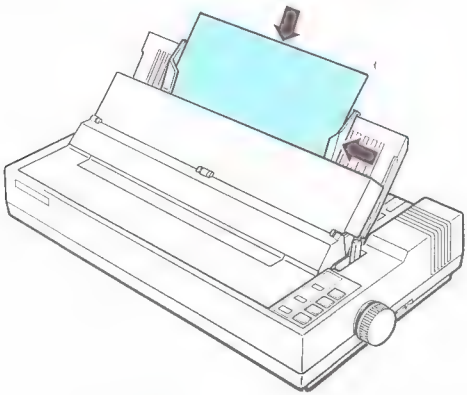


- To run the self test in high speed draft mode, you must enter that mode as described in Chapter 3.
- When Roman or Sans Serif is selected with SelecType, the self test runs in the NLQ mode even if you press the LINE FEED button.

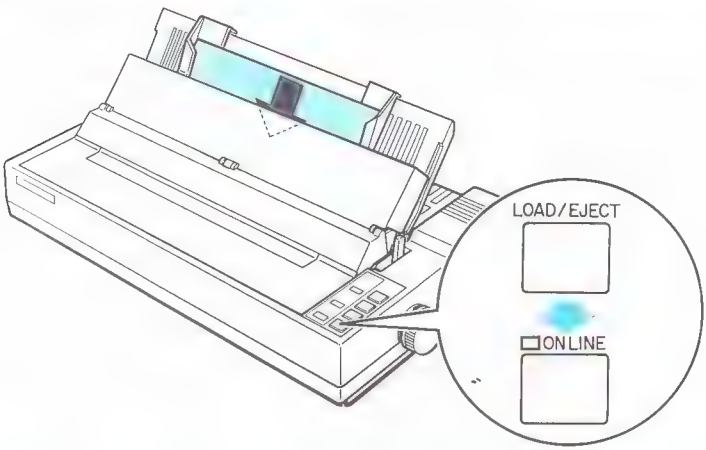
3. Move the left edge guide so it locks in place next to the guide mark.



4. Adjust the right edge guide to match the width of your paper. Next, slide a sheet down between the edge guides until it meets resistence.

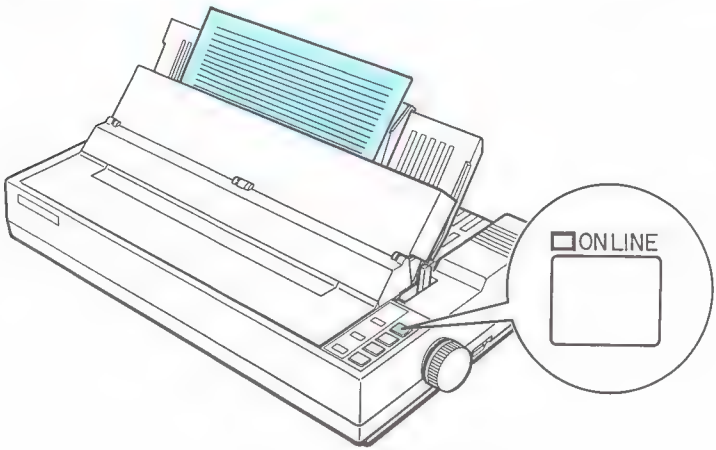


5. Press LOAD/EJECT button to load paper, then press the ON LINE button.



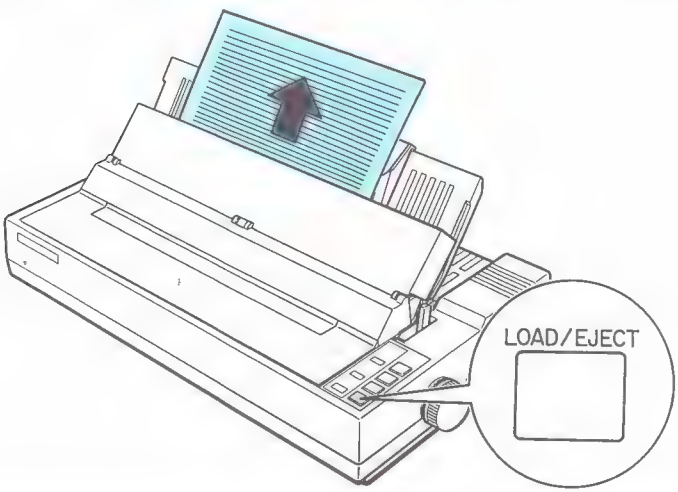
Never run the self test using paper that is narrower than the maximum printable area, because the print head will then print directly on the platen. Never perform the self test on envelopes.

6. A list of DIP switch settings is printed first, followed by a series of characters. The self test continues until the paper runs out or you press the ON LINE button. If the test results are satisfactory and you wish to stop the test, press the ON LINE button.



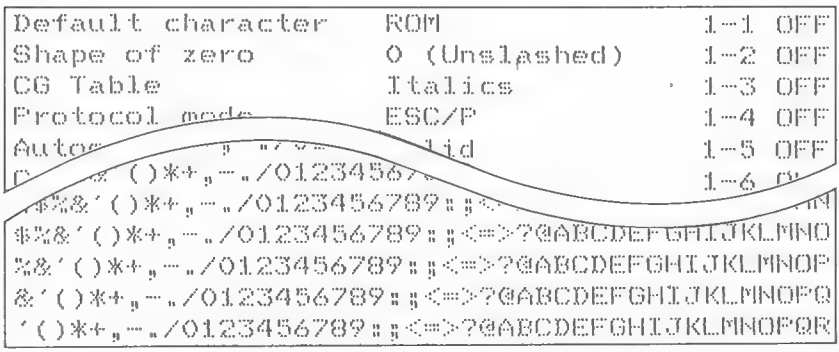
To resume the test, press the ON LINE button once more.

7. To end the self test, press the LOAD/EJECT button to eject paper, then turn the printer off.

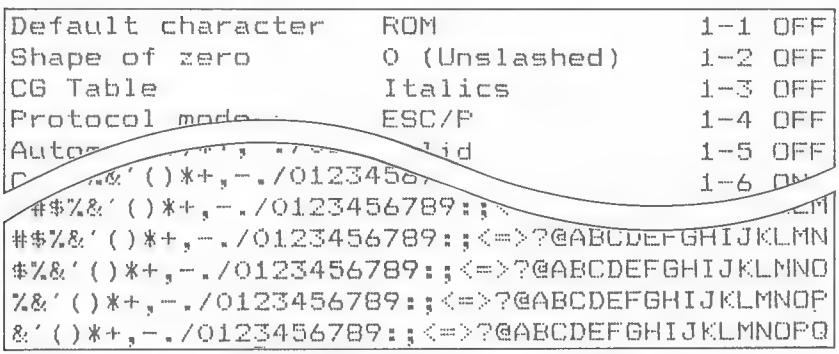


Part of a typical draft self test is shown below:

High speed draft mode



Normal draft mode



NLQ mode

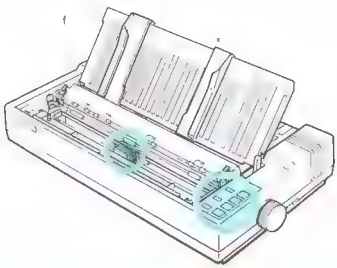
```
Default character     ROM                1-1 OFF
Shape of zero         0 (Unslashed)      1-2 OFF
CG Table              Italics            1-3 OFF
Protocol mode         ESC/P              1-4 OFF
A                     Valid              1-5 OF
 #$%&'()*+,-./01                S.A.
"#$%&'()*+,-./0123456                          JKLM
#$%&'()*+,-./0123456789:;<=                    FGHIJKLMN
$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOP
&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQ
```

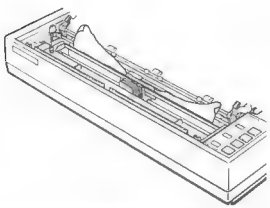
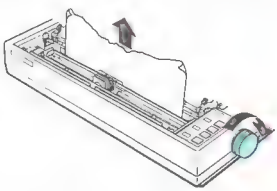
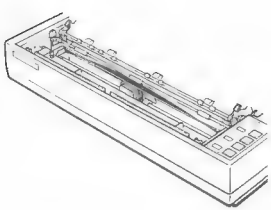
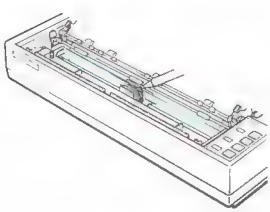
When using the optional cut sheet feeder, the first page of the self test print out is slightly different. For details, see the section on page length in Chapter 3.

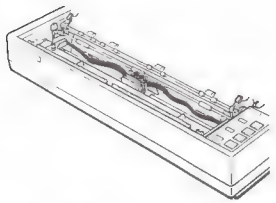
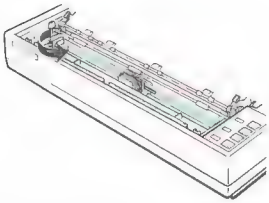
Checking the operation

If the self test does not print properly, check the points below.

The points that need to be checked are the print head area and the control panel operation.



Check point	Possible Solution
Paper caught on print head. 	Turn off the power, remove the paper using the platen knob, then load a new sheet. 
Ribbon has come loose. 	Use a pointed object to guide the ribbon between the print head and ribbon guide while turning the ribbon-tightening knob to take up excess slack. 

Check point	Solution
Excess slack in the ribbon. 	Turn the ribbon-tightening knob. 
No print, even though printer turned on with FORM FEED or LINE FEED button held down.	Be sure to hold down the relevant button while you turn on the printer.
No print, even though FORM FEED or LINE FEED button held down.	Hold down the relevant button longer.

If the printer still does not print the self test correctly, contact your Epson dealer.

If the self test printed correctly, you are now ready to connect your printer to the computer.

If your computer can communicate with the printer using a parallel interface and you have a suitable shielded cable, you should be able to connect your printer immediately. If your computer requires another type of interface, you will need to install an optional interface board.

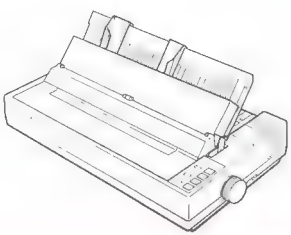
If you are unsure whether your computer is equipped with a parallel interface, refer to your computer's operating manual. If your computer is not equipped with a parallel interface, see the section on interface boards in Chapter 5.

The parallel interface

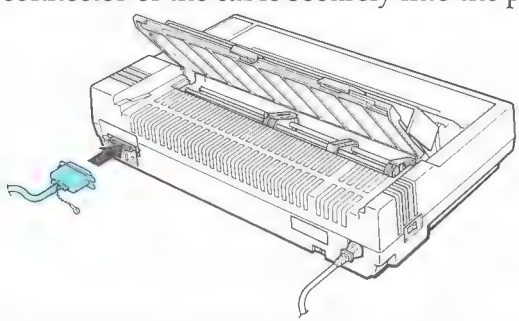
Connect the parallel interface cable as described below:

Before connecting the parallel interface cable, make sure that:

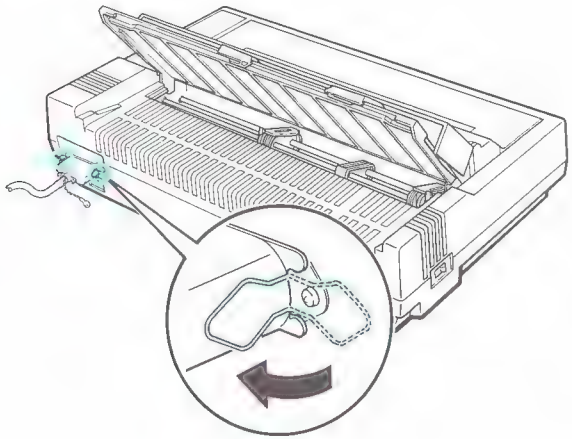
- The printer is turned off.
- The computer is turned off.



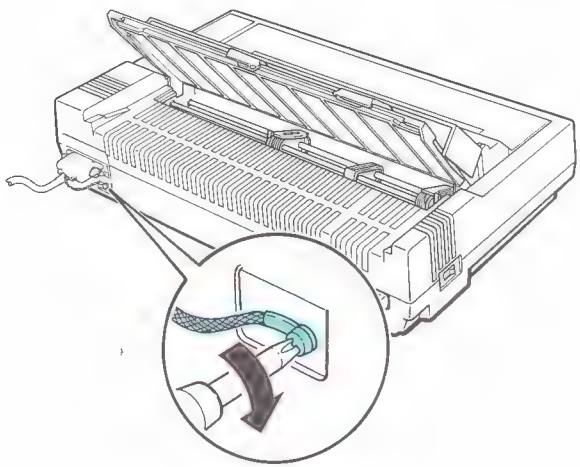
1. Plug the connector of the cable securely into the printer.



2. Squeeze the wire clips together until they lock in place on either side of the connector.

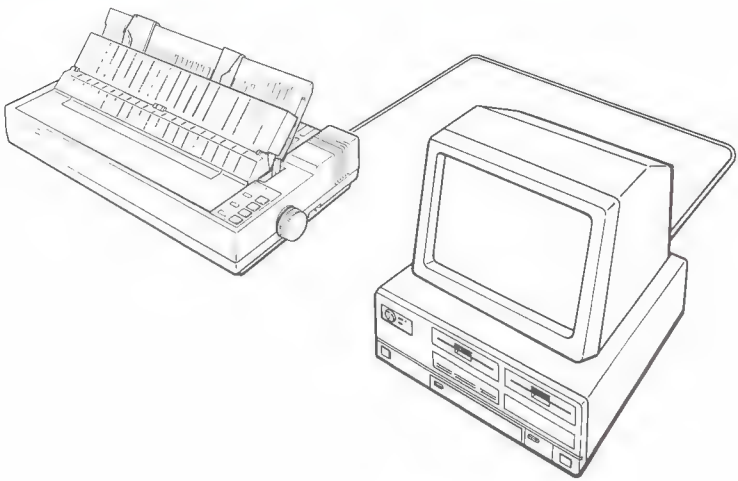


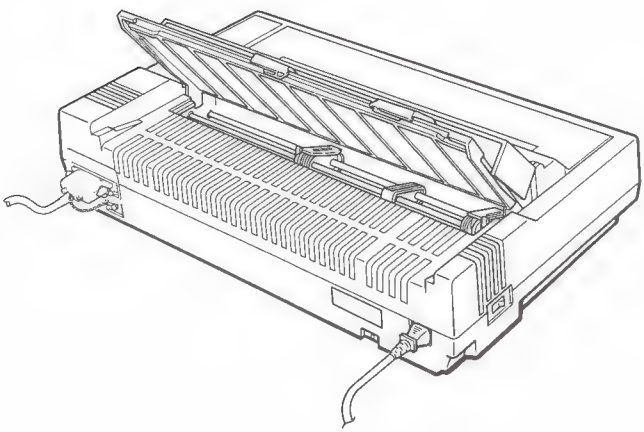
If your cable has a ground wire, connect it to the ground connector beneath the interface connector.



3. Plug the other end of the cable into the computer. If there is a ground wire at the computer end of the cable, attach it to the ground connector at the back of the computer.

The cable connection between the printer and your computer is now completed.





Setting Up Your Application Software

Now you have set up and tested the FX, you should make sure that it works with the application programs let you specify the type of printer you are using so that the program can take full advantage of the printer's features. Many of these programs provide an installation or set up section that presents a list of printers from which to choose.

Choosing from a menu

If your software has a printer selection menu, simply choose FX-850 or FX-1050. Because the family of Epson printers shares a great many commands, you can use an application program even if it does not list the FX-850 or FX-1050 on its printer selection menu.
Choose from the following list:

FX-850	FX-1050
FX-800	FX-1000
EX-800	EX-1000
FX-85	FX-105
FX-80+	FX-100+
FX-80	FX-100
FX	FX
Epson printer	Epson printer
9-pin printer	9-pin printer

If you plan to use the IBM printer emulation mode, choose IBM Proprinter (XL), IBM Graphics printer, or IBM printer, in that order of preference.

Chapter 2 Paper Handling

Using Single Sheets 2-2
Loading the paper 2-2

Using Continuous Paper 2-6
Positioning your continuous paper supply .. 2-6
Loading continuous paper 2-7

Switching between Continuous and Single Sheets 2-14
Switching to single sheets 2-14
Switching back to continuous paper 2-18

Printing on Special Paper 2-20
The paper thickness lever 2-20
Multi-part forms 2-23
Labels 2-24
Envelopes 2-25

Using Single Sheets

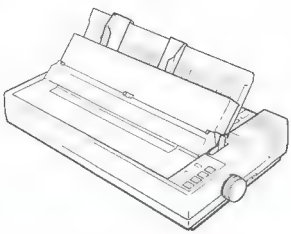
Your printer can handle a wide range of paper sizes up to a maximum width of 10.1 inches on the FX-850 or 14.4 inches on the FX-1050.

If you do most of your printing on single sheets, you may find it more convenient to install the optional cut sheet feeder. This option automatically inserts a new sheet whenever required and can hold up to 150 pages. For more details, see Chapter 5.

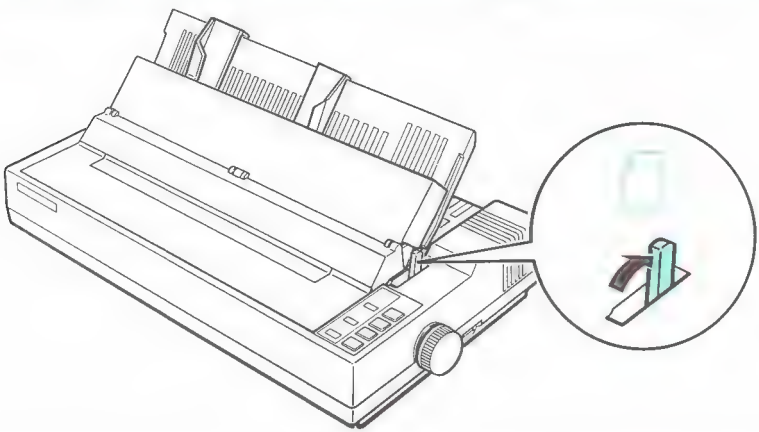
Loading the paper

Before loading the paper, make sure that:

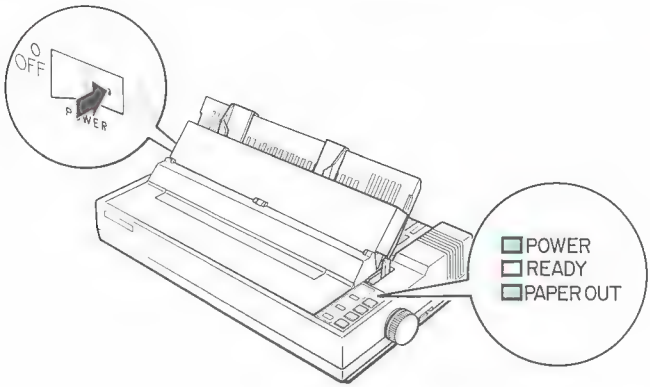
- The printer is turned off.
- The paper tension unit is attached.
- The paper guide is in the upright position.
- The printer cover is attached.



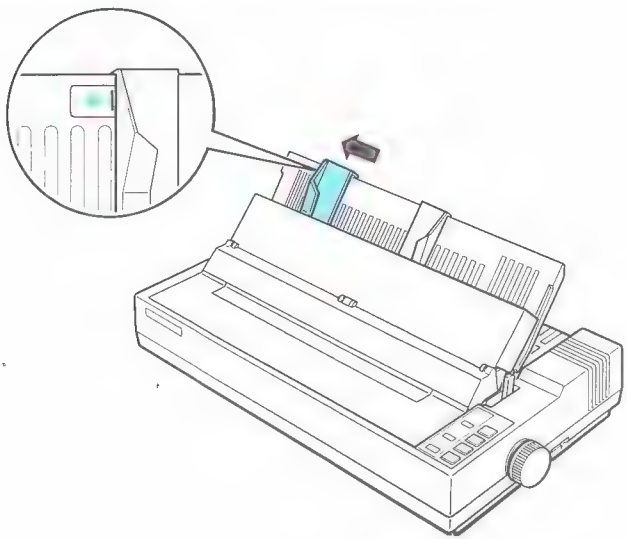
1. Push the paper release lever back to the single sheet position.



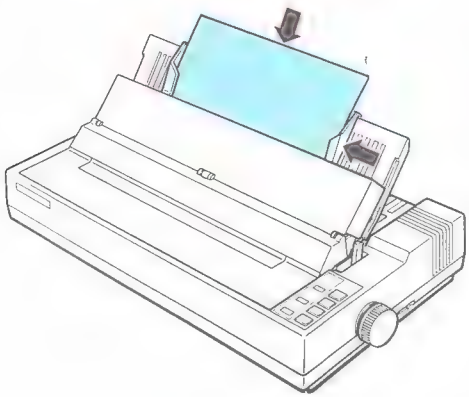
2. Turn on the printer. The green POWER light should come on.



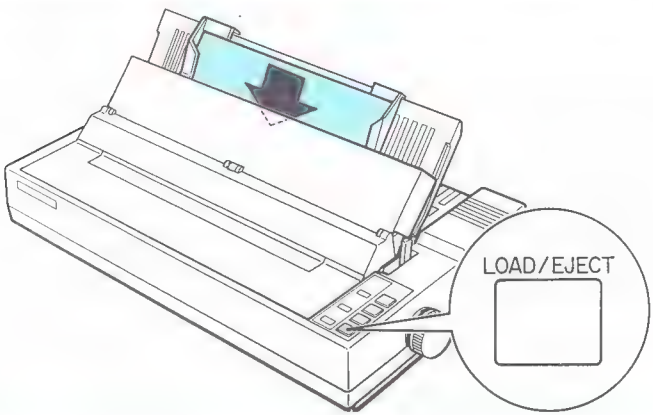
3. Align the left edge guide with the arrow on the paper guide. (You may want to change this position later, depending on the margin settings of your applications program.)



4. Adjust the right edge guide to fit the size of the paper. Then, slide the paper down between the edge guides until it meets resistance.



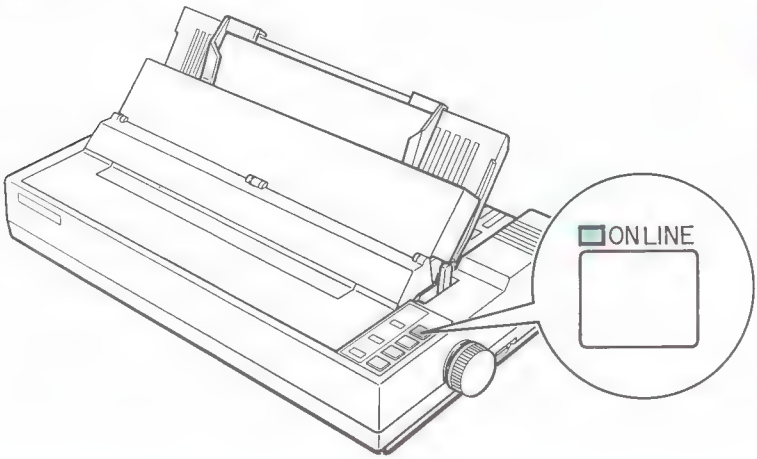
5. Press the LOAD/EJECT button once to automatically load the paper.



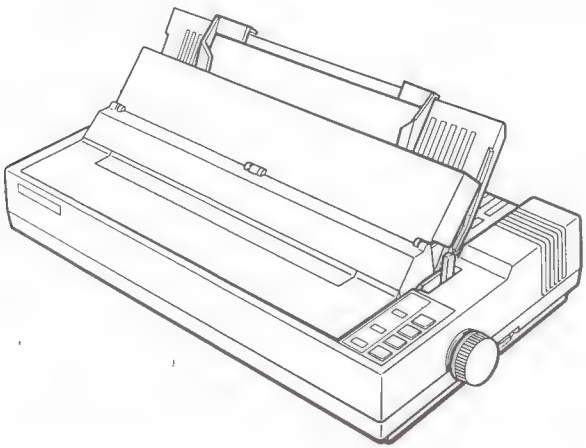
Никога не използвайте

Never advance the paper using the platen knob while the printer is turned on.
If the platen turns without loading the paper, remove the paper and re-insert it more firmly, then press the LOAD/EJECT button again.

6. Press the ON LINE button to set the printer on line. When the ON LINE indicator is lit, the printer can accept data from your computer.



You are now ready to begin printing.



To eject the paper, set the printer off line by pressing the ON LINE button once again. When the ON LINE light goes out, press the LOAD/EJECT button.

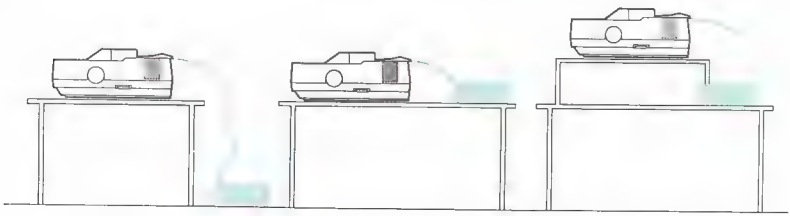
Using Continuous Paper

The tractor built into the FX-850 and FX-1050 is remarkably easy to load and operate. Its low-profile design takes up little space and can handle a wide variety of paper widths (up to a maximum of 10.0 inches on the FX-850, and 16.0 inches on the FX-1050).

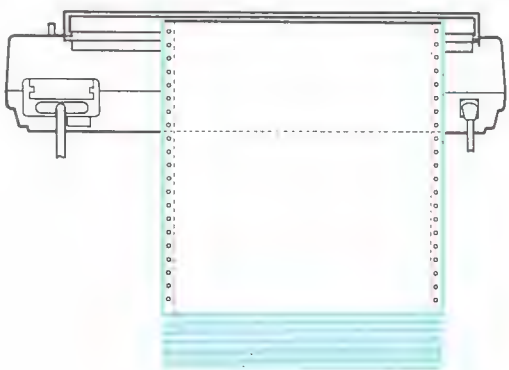
Positioning your continuous paper supply

An important consideration for achieving smooth and accurate paper feeding is the position of your supply of continuous paper.

Three ways of positioning your printer and supply of continuous paper are shown below.



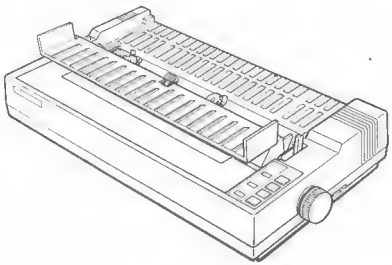
It is also important to evenly align the paper stack with the tractor to ensure that paper feeds smoothly and straight into the printer.



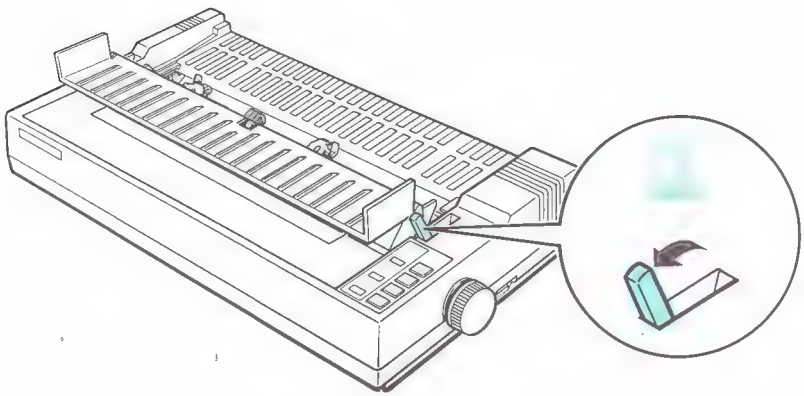
Loading continuous paper

Before loading continuous paper, make sure that:

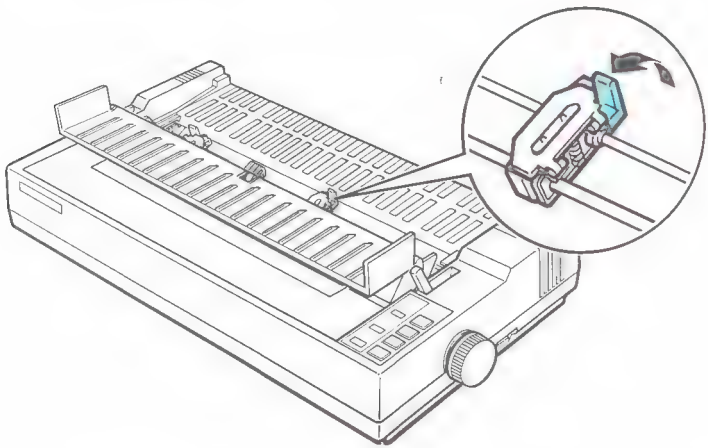
- The printer is turned off.
- The paper tension unit is attached.
- The paper guide cover is opened.
- The paper guide is removed.



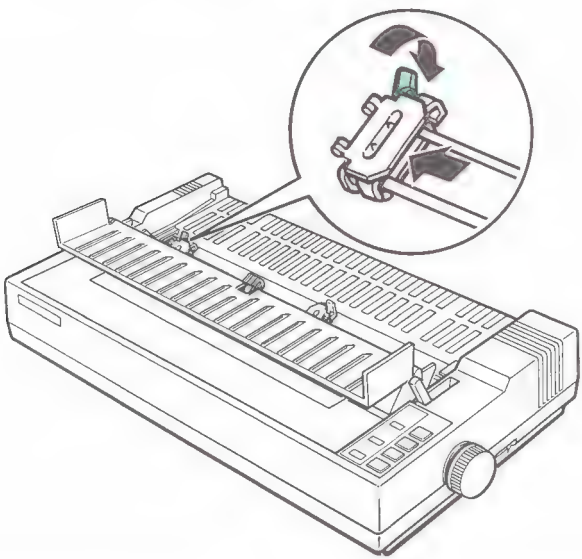
1. Set the paper release lever to the continuous paper position.



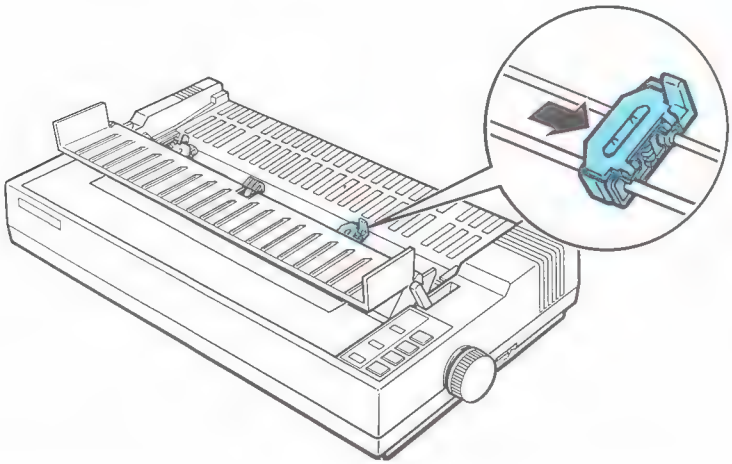
2. Release the sprocket locks by pulling the sprocket lock levers forward.



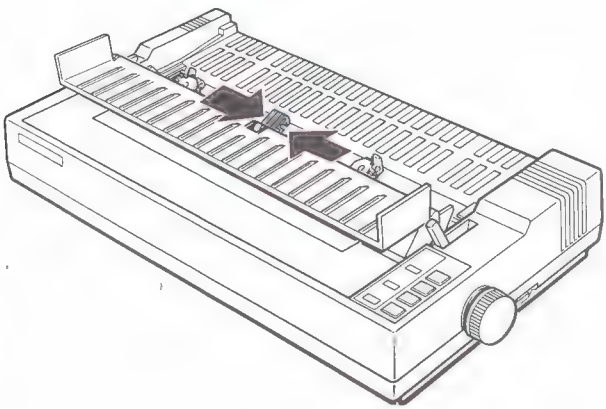
3. Slide the left sprocket frame all the way to the left and lock it in place.



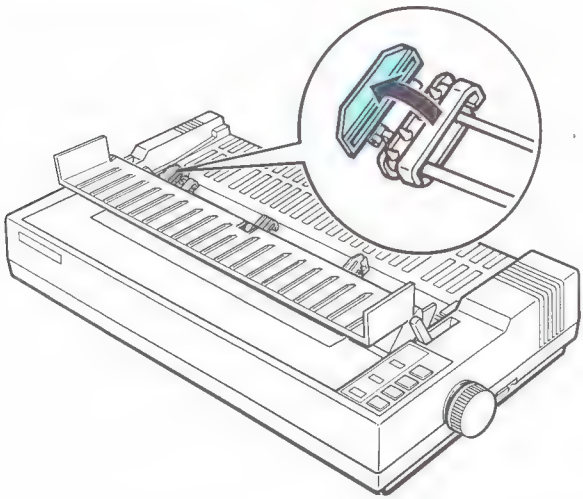
4. Slide the right sprocket frame to match the width of your paper, but do not lock it.



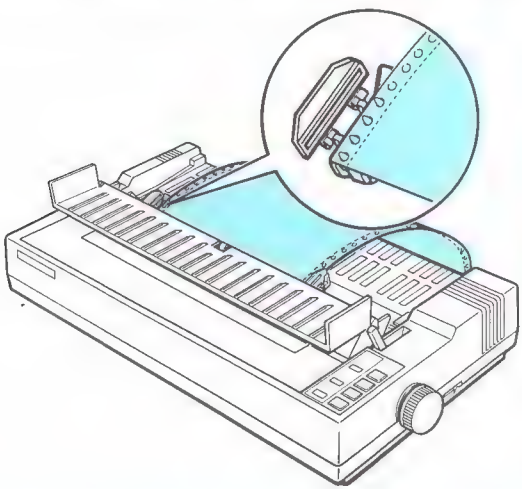
5. Position the paper support midway between the two sprocket units.



6. Open both sprocket covers.

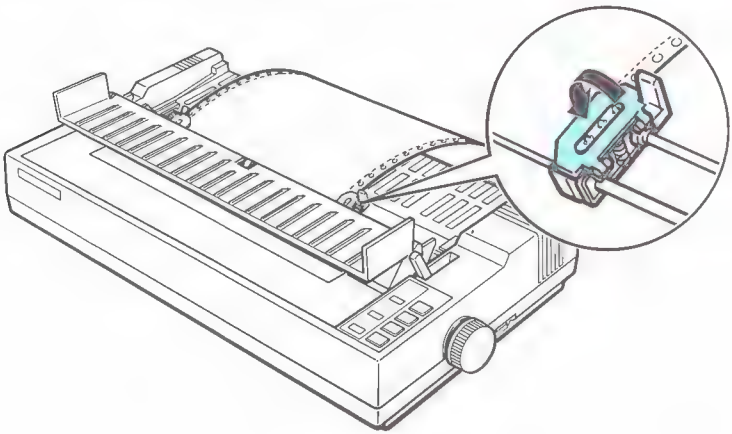


7. Fit the first four holes in the paper over the pins of each sprocket unit.

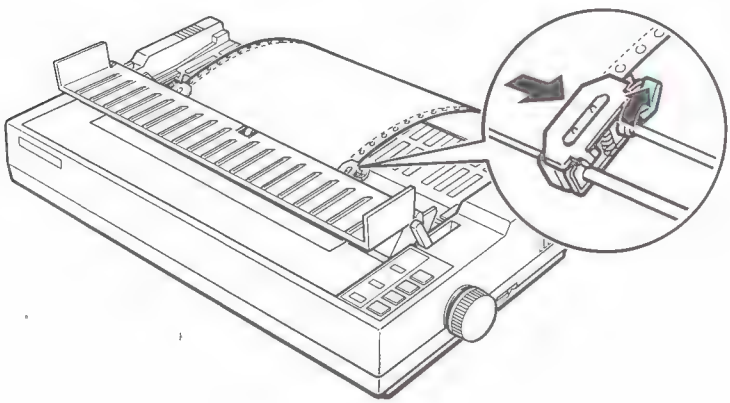


Make sure that your paper has a clean, straight edge before inserting it into the printer.

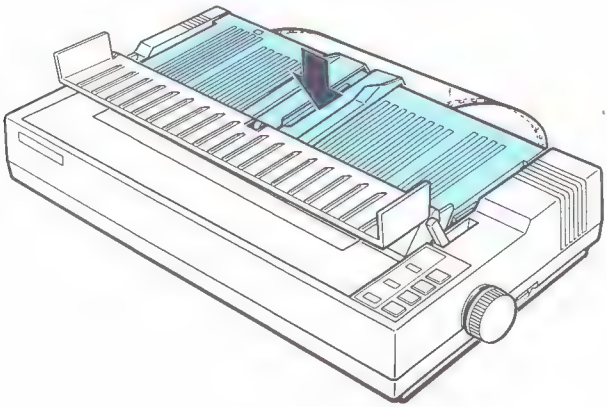
8. Close the sprocket covers.



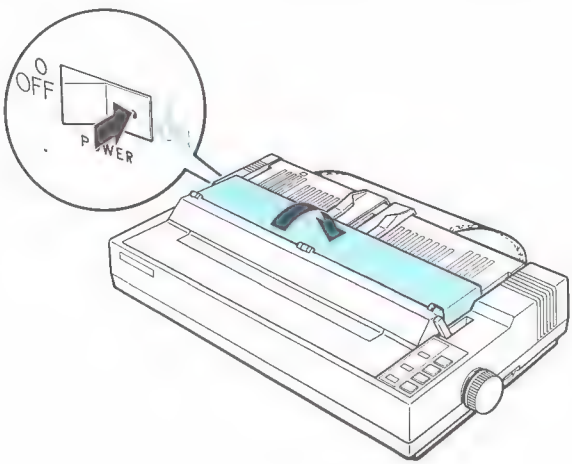
9. Slide the right sprocket unit to a position where the paper is straight and has no wrinkles, then lock it in place.



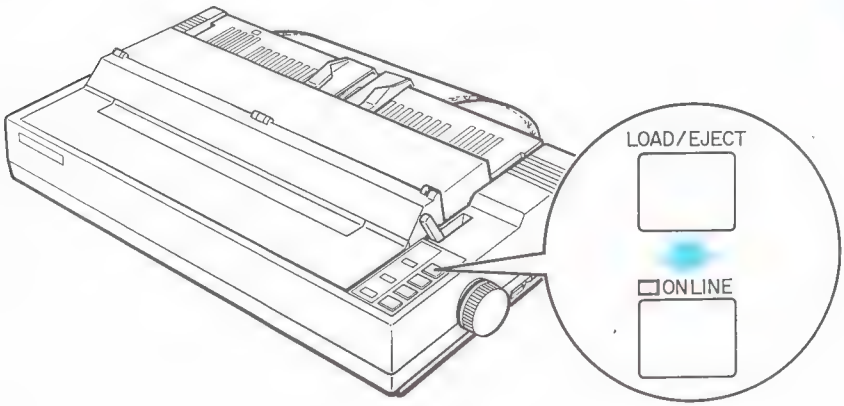
10. Reattach the paper guide as shown below.



11. Close the paper guide cover and turn on the printer.



12. Press the LOAD/EJECT button to feed paper to the loading position. Then, press the ON LINE button to set the printer on line so that it can accept data.



If you find that your word processing or other application program prints too high or too low on the page or is printing on the perforations, check the loading position.

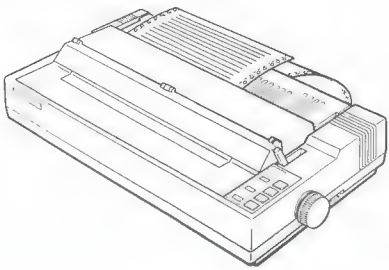
If you need to adjust this setting, you can use the micro adjustment feature. This feature gives you precise control over the position of your paper by allowing you to feed the paper either forward or backward. For more information, see the section on the micro adjustment feature in Chapter 3.

Even with continuous paper loaded in the printer, you can easily switch to single-sheet printing without removing the continuous paper from the tractor. To switch from continuous paper to single sheets, follow the steps below.

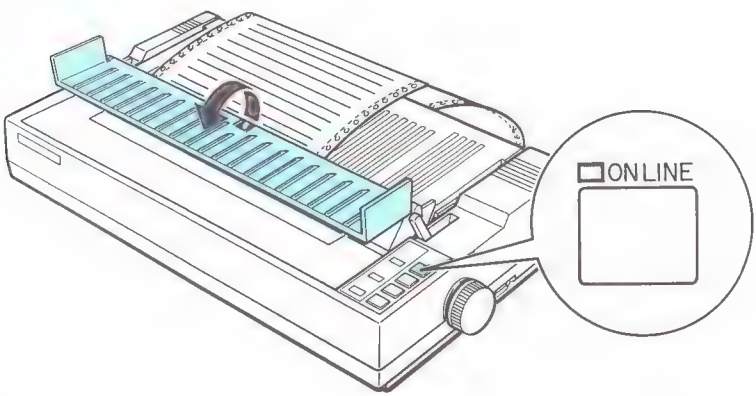
Switching to single sheets

Before switching to single sheet paper, make sure that:

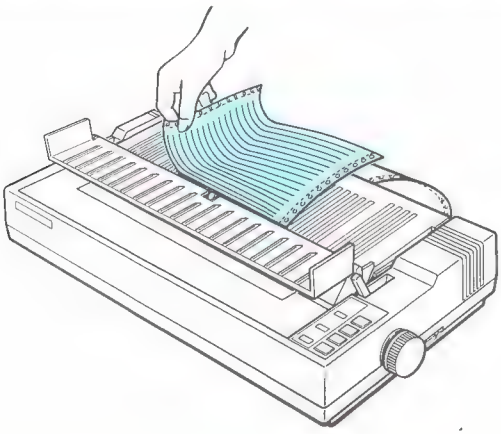
- The printer is on line
- You have been printing with continuous paper



1. Open the paper guide cover and press the ON LINE button to set the printer off line.

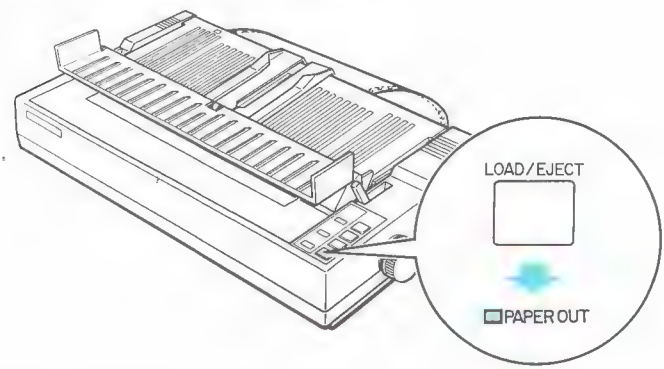


2. Remove your printed document. If you are not using the short tear-off function, you need to press the FORM FEED button to advance your document to a point where it can be removed.



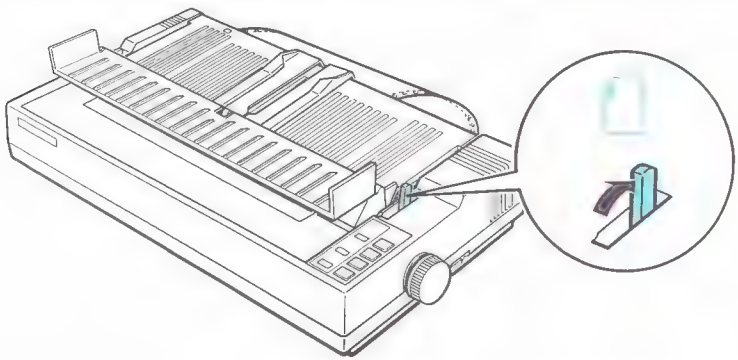
To avoid feeding your continuous paper backward more than is necessary, always make sure that you tear off the printed document before pressing the LOAD/EJECT button.

3. Press the LOAD/EJECT button to feed the continuous paper backward out of the printer and into the standby position. The paper is still attached to the tractor, but is no longer in the paper path. The PAPER OUT light comes on when the paper is completely out of the paper path.

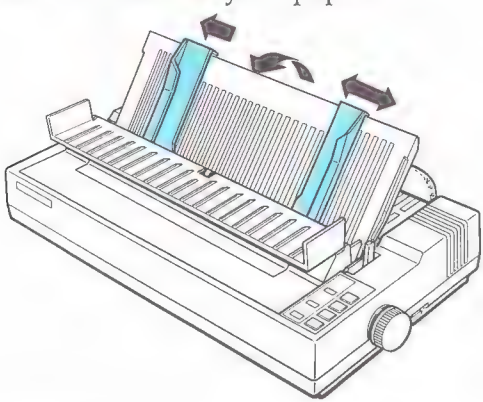


Pressing the LOAD/EJECT button once may not feed the paper back far enough to reach the standby position. If the PAPER OUT light does not come on, you need to press the LOAD/EJECT button again. With normal-width continuous paper, you can press the LOAD/EJECT button up to three times. If, however, you are using narrow paper (between 4 to 6 inches) you should only press the LOAD/EJECT button once. Do not use this button to eject labels.

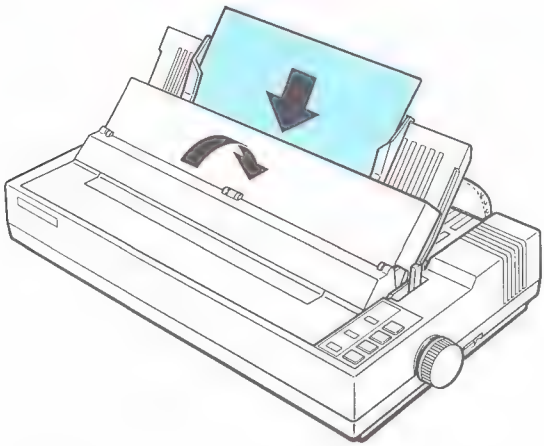
4. Push the paper release lever back to the single sheet position.



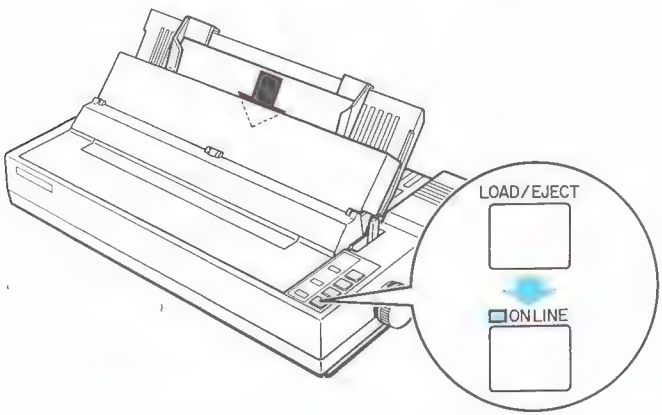
5. Stand the paper guide upright, and adjust the edge guides to roughly match the width of your paper.



6. Close the paper guide cover. Next, insert the paper between the edge guides.



7. Press the LOAD/EJECT button to automatically feed the paper to the loading position. Then, press the ON LINE button to set the printer on line and make it ready to print.

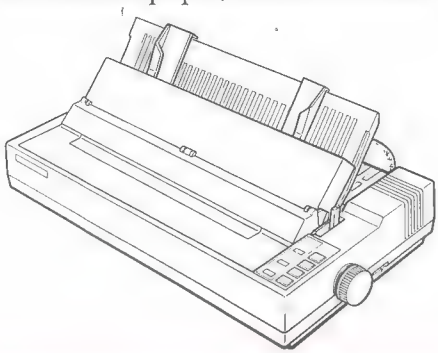


This completes the change-over from continuous to single sheet paper.

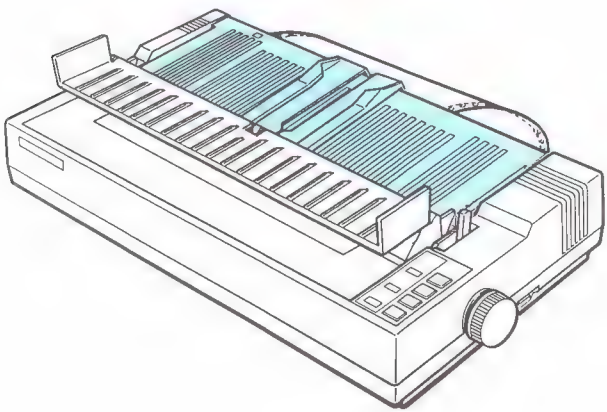
Switching back to continuous paper

Before switching back to printing with continuous paper, make sure that:

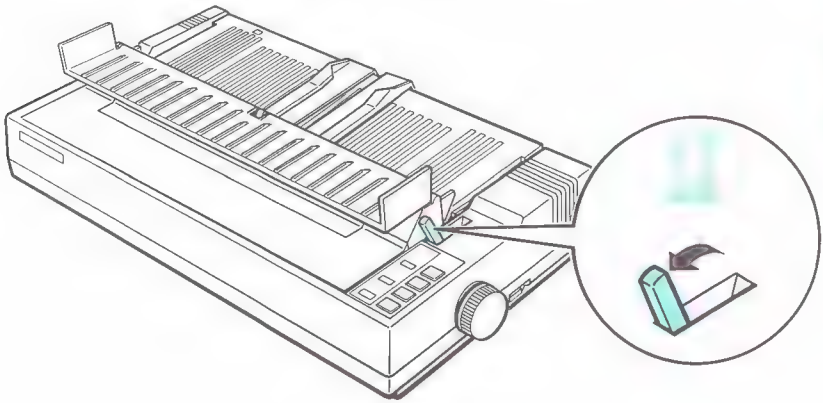
- The single sheet has ejected.
- The printer is off line.



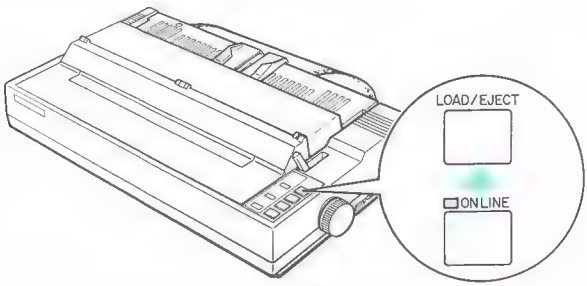
1. Open the paper guide cover. Next, lower the paper guide onto the back of the printer.



2. Pull the paper release lever toward you.



3. Press the LOAD/EJECT button to feed the continuous paper to the loading position. Then, press the ON LINE button to set the printer on line so that it can accept data.



This completes the change-over back to continuous paper.

Printing on Special Paper

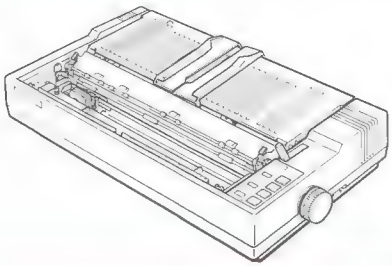
In addition to printing on single sheets and continuous paper, your printer can also print on a wide variety of paper types, such as multi-part forms and labels. You can also feed envelopes, either manually or with the optional cut sheet feeder.

Before printing on special types of paper, you need to change the paper thickness setting.

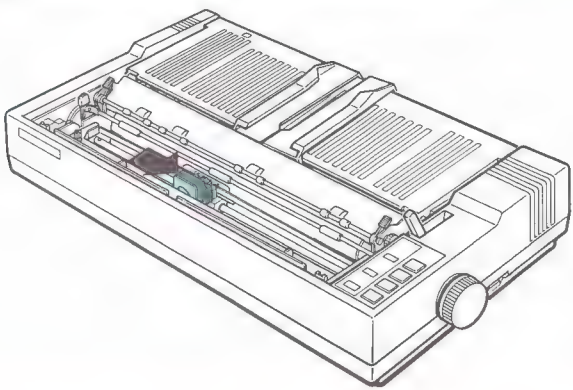
The paper thickness lever

Before setting the paper thickness lever position, make sure that:

- The printer is turned off.
- The printer cover is removed.

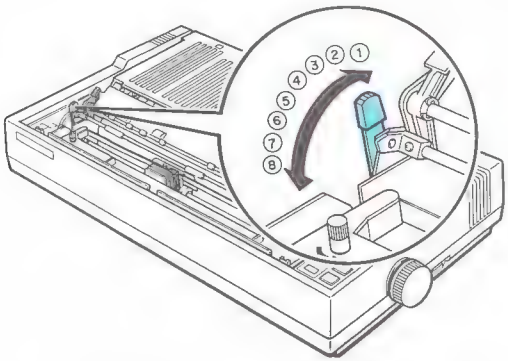


1. Slide the print head to the middle of the printer.



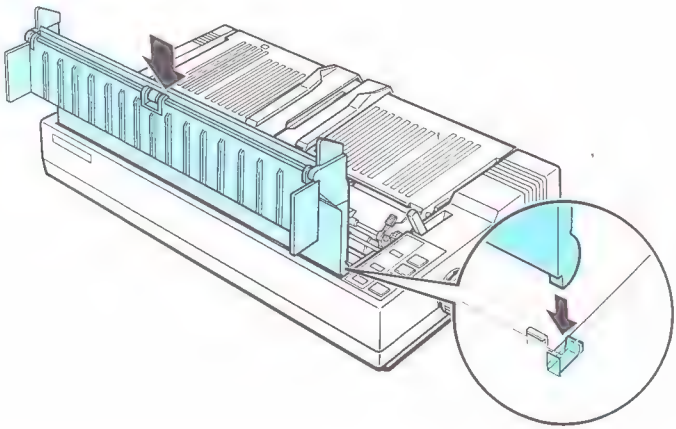
If the printer has been used recently, the print head may be hot. Let it cool before attempting to move it.

2. Refer to the following table on and set the paper thickness lever to match the thickness of your paper.



Paper Type	Lever Position
Paper (single sheets or continuous)	2
Thin paper	2
Multi-part paper	
2-sheet	3
3-sheet	3
4-sheet	4
Labels	3
Envelopes	
Air mail	3 or 4
Plain	5
Bond (20 lb.)	5
Bond (24 lb.)	6

3. Attach the printer cover.



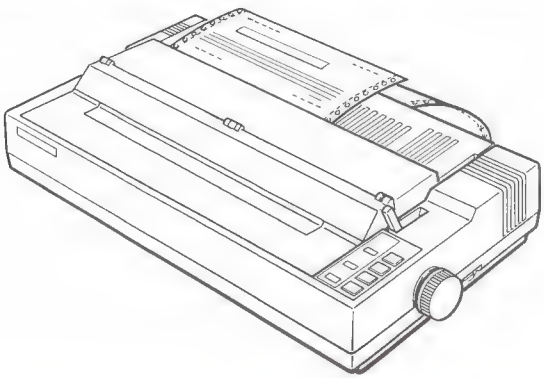
Always return the lever to position 2 when you go back to printing on ordinary paper.

When printing on anything thicker than normal paper, make sure that printing stays within the limits of the printable area of the forms. Printing past the edge of thicker paper can damage the print head.

Multi-part forms

Your printer's built-in tractor unit makes it possible to print on continuous multi-part forms. You can use multi-part forms which have up to four parts including the original. Make sure you set the paper thickness lever to the proper position; refer to the table on page 2-21.

Except for the paper thickness lever setting, multi-part paper is loaded the same way as continuous paper. For details, see the section on loading continuous paper in this chapter. Pay special attention to the setting of the top of form position and page length.

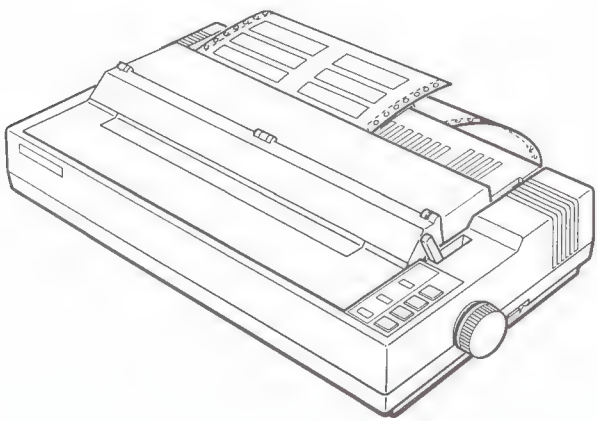


Do not use multi-part forms with the single-sheet feeding system or the optional cut sheet feeder.

Labels

If you need to print labels, always use the type mounted on a continuous base sheet provided with sprocket holes for use with the tractor. If you attempt to print labels using the single-sheet feeding system, labels on a shiny base sheet almost always slip a little.

Labels are loaded the same way that you load continuous paper. See the section on loading continuous paper in this chapter for details. The only difference is that you need to adjust the paper thickness lever to match the thickness of the labels. See the table on page 2-21 for the correct paper thickness setting.

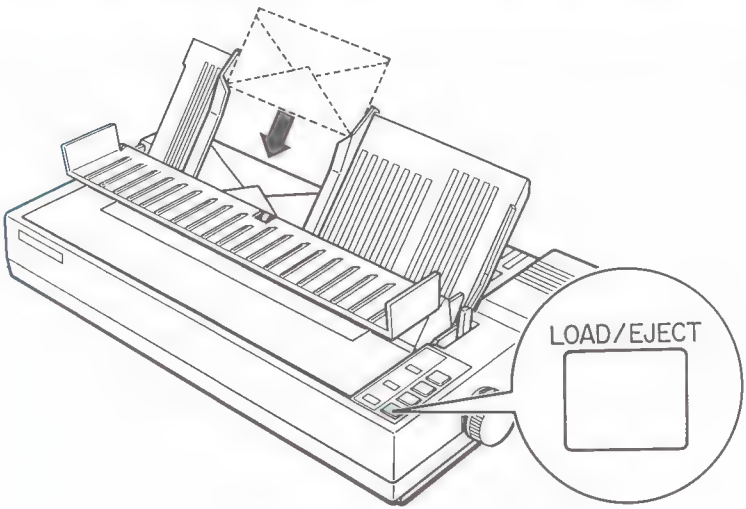


Never feed the labels backward through the printer. Labels can easily come off the backing and jam the printer. Therefore, never use the LOAD/EJECT button to eject labels or to feed labels backward to the standby position. If a label does become stuck in the printer mechanism, refer the problem to your dealer. Also, never use the short tear-off function with labels (Be sure to set DIP switch 1-5 to ON).
Since labels are especially sensitive to temperature and humidity, always use them under normal operating conditions.

Envelopes

You can feed envelopes individually using the single sheet loading feature or using the optional cut sheet feeder. However, before setting envelopes, you should adjust the position of the paper thickness lever. For details on paper handling, see "Using Single Sheets" on page 2-2 and "The Cut Sheet Feeder" in Chapter 5.

With manual feed, you may have to press down slightly while pressing the LOAD/EJECT button to get envelopes to feed properly.



When printing on envelopes, be sure that your application program settings keep the printing entirely within the printable area of the envelopes.

To make sure that the printing fits within the printable area, always perform a sample printing test using a normal single sheet of paper before printing on envelopes.

Chapter 3 Using the Printer

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- The DIP switch functions 3-7

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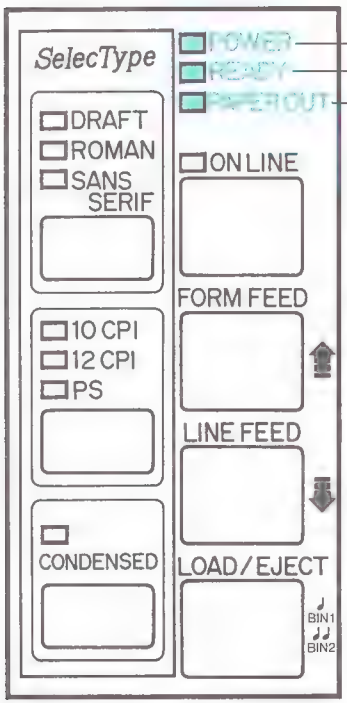
Operating the Control Panel

The buttons on the control panel let you control many of the printer settings. The control panel also has indicator lights so you can check the current status of the printer's various settings.

Lights

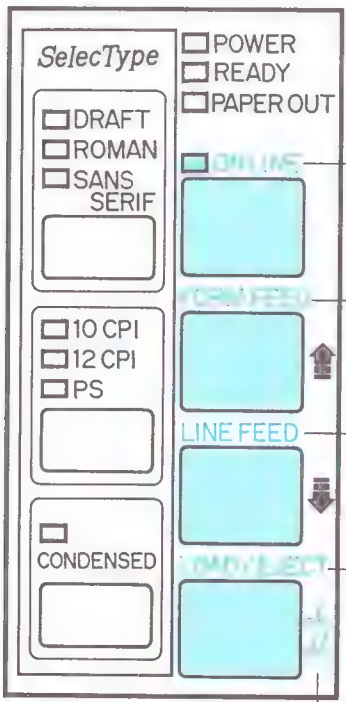


POWER (green)
On when the POWER switch is on, and power is supplied.

READY (green)
On when the printer is ready to accept input data. This light flickers while data is printed.

PAPER OUT (red)
On when the paper-out detector detects that the printer is out of paper.

Buttons



ON LINE

This button controls the printer's on line/off line status. When the printer is on line, this light is on and the printer can receive and print data from the computer. When this lamp is flickering, the micro adjustment function can be used.

FORM FEED

When the printer is off line, press this button to eject a single sheet of paper or to advance continuous paper to the top of the next page.

LINE FEED

When the printer is off line, press this button to advance the paper one line, or hold it down to advance the paper continuously.

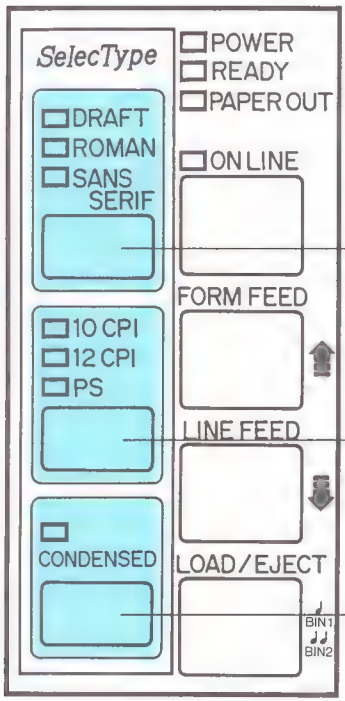
LOAD/EJECT

When the printer is off line, press this button to feed the paper to the loading position, or to eject paper when paper is already loaded. Paper is ejected forward if the paper release lever is set to the single sheet position, and is ejected backward (removed from the paper path) if the release lever is set to the continuous paper position.

BIN1/BIN2

When the printer is on line, press this button to change between bin 1 and bin 2 on the optional dual bin cut sheet feeder. The buzzer sounds once if bin 1 is selected, or twice if bin 2 is selected.

SelecType



FONT
This button is used to select NLQ ROMAN, NLQ SANS SERIF, or DRAFT mode. The yellow indicator light shows the selected font.

PITCH
This button is used to select 10 CPI, 12 CPI, or PS (proportional) spacing. The yellow indicator light shows the selected pitch.

CONDENSED
This button is used to select or deselect the condensed mode. The yellow indicator light is on when the printer is in the condensed mode. In this mode all characters are printed at approximately 60% of their normal width.

The combination of proportional and condensed does not work. In that case, the printer selects the proportional mode.

Other control panel features

The control panel of your printer also gives you access to several special functions.

Self test: High-speed draft, normal draft and NLQ self test function are built into the printer. The self test printout lets you check the current DIP switch settings and operating status of the printer. The printer executes the self test when you hold down the LINE FEED button or the FORM FEED button while turning your printer on.

See the section on testing the printer in Chapter 1 for more information.

Data dump: By holding down both the LINE FEED and FORM FEED buttons while you turn on the printer, you turn on the data dump mode. This feature allows advanced users to locate the source of communications problems between the computer and printer. See the section on the data dump mode on page 3-28 for more information.

Micro adjustment: This function is used to adjust both the paper loading position and the short tear-off position. These positions can only be adjusted while the ON LINE lamp is flickering.
Pressing the FORM FEED button feeds the paper forward, and pressing the LINE FEED button feeds the paper backward to adjust the position. See the section on the loading position and short tear-off in this chapter.

Input buffer control: The input buffer can be enabled or disabled by turning on the power while pressing the LOAD/EJECT button. The buzzer sounds once if the input buffer is disabled, or twice if it is enabled. Use the self test to check the input buffer's current state.

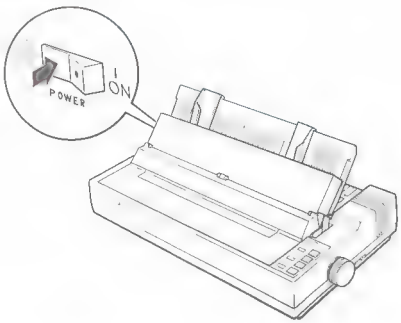
Draft printing speed The printer can be set to either high-speed draft mode or normal draft mode.
Turn on the power while pressing the FONT button. The buzzer sounds once if normal draft mode is selected, or twice for high-speed draft mode.

Setting the DIP Switches

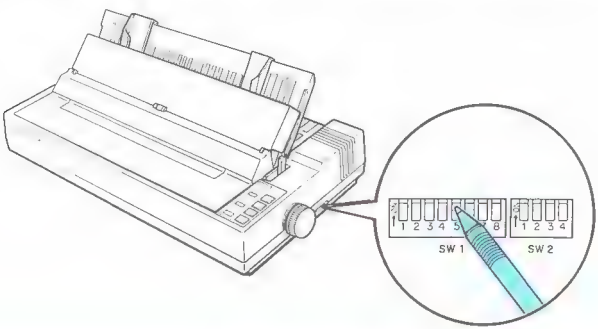
By changing the settings of the two sets of DIP (Dual Inline Package) switches located below and rearward of the platen knob, you can control various printer features, such as the character set and page length. These new settings become valid whenever the printer is turned on, reset or initialized.

Changing a DIP switch setting

1. Turn off the printer.



2. Use a pointed instrument, such as a pen or pencil, to change the DIP switch setting.



Your new settings will not become effective unless the printer is turned off and on.

Changing of DIP switch settings is now completed. The new DIP switch settings become valid when the printer is turned on.

The DIP switch functions

The tables below describe the function of the DIP switches.

DIP Switch 1

SW	Description	ON	OFF	Page
1-1	Default character set	User-defined	ROM	3-8
1-2	Shape of zero	Slashed	Not slashed	3-8
1-3	Table select *	Graphic	Italic	3-26
1-4	Protocol mode	IBM emulation	ESC/P	3-8
1-5	Short tear off mode	Invalid	Valid	3-16
1-6	International character set *	See Table 1		3-24
1-7				
1-8				

* Functions of these switches differ when the priter is used in the IBM emulation mode. For details, see Protocol mode on page 3-8.

DIP Switch 2

2-1	Page length	12 inch	11 inch	3-10
2-2	Cut sheet feeder mode	On	Off	5-2
2-3	1-inch skip over perforation	On	Off	3-12
2-4	Auto line feed	On	Off	3-9

The shaded areas represent DIP switch settings that have been preset at the factory. The preset for DIP switches 1-3, 1-5 and 2-1 will vary according to country.

Table 1 International character sets

Country	SW 1-6	SW 1-7	SW 1-8
USA	ON	ON	ON
France	ON	ON	OFF
Germany	ON	OFF	ON
UK	ON	OFF	OFF
Denmark	OFF	ON	ON
Sweden	OFF	ON	OFF
Italy	OFF	OFF	ON
Spain	OFF	OFF	OFF

The factory-preset DIP switch settings vary according to country.

Default character set

When DIP switch 1-1 is ON, the user-defined character set will be selected as default. User-defined characters are maintained in printer memory even when the power is turned off, so the user-defined character set can be easily selected simply by setting this switch to ON.This switch is only effective when the printer is used in the ESC/P mode.

User-defined characters cannot be defined (ESC & and ESC :) when this switch is set to ON.

Shape of zero

When DIP switch 1-2 is ON, prints a slashed zero (Ø); when OFF, prints open zeroes (0). Useful for clearly distinguishing between uppercase O and zero when printing program lists, etc.

Protocol mode

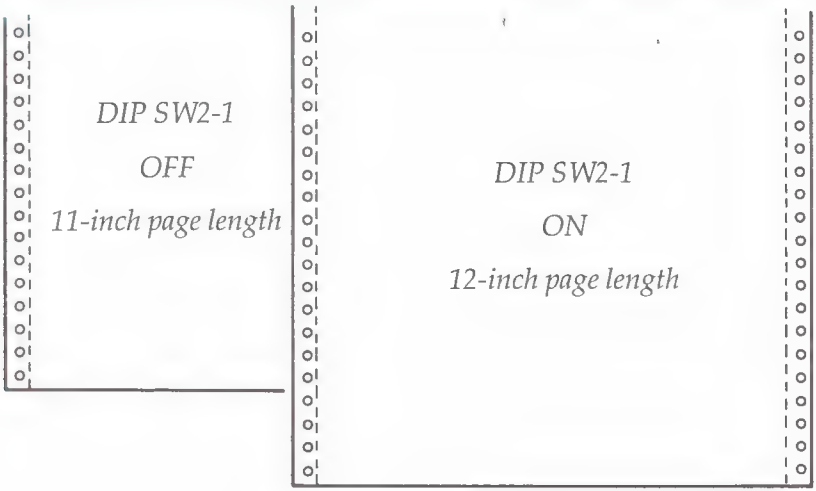
When DIP switch 1-4 is ON, printer operates in the IBM emulation mode; when off, printer operates in the Epson ESC/P mode.
Functions of certain DIP switches differ when the printer is used in the IBM emulation mode.
DIP switch 1-3 controls the automatic carriage return function. When this switch is set to OFF, the printer automatically makes a carriage return whenever it receives LF or ESC J.
For functions of DIP switches 1-6, 1-7, and 1-8 in the IBM emulation mode, see "Selecting an international character set " on page 3-24.

Auto line feed

When DIP switch 2-4 is ON, a carriage return code (CR) causes an automatic line feed; when OFF, line feeds occur only when the printer receives line feed codes (LF). Since some computers/application programs automatically append line feeds to carriage returns, the setting you use will depend on your host computer and application program.

Page Length

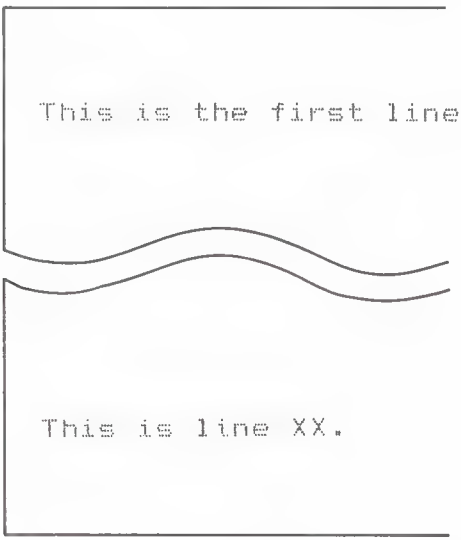
By changing the setting of DIP switch 2-1, you can select a page length of 11 inches (27.94 cm) or 12 inches (30.48 cm). Be sure to set the page length to match the paper you will be using.



Page lengths other than 11 and 12 inches can be set using the commands ESC C and ESC C 0. See the Command Summary in Chapter 10 for details.

In the cut sheet feeder mode

When the self test is executed in the cut sheet feeder mode, two lines are printed on the first page printed by the self test as shown below.



The first line printed indicates the position of the first printable line on the page, and the second line indicates the position and line number of the last printable line. The value indicated for the last printable line is automatically stored in printer memory as the page length, so ordinarily you will not have to set a different page length. However, some application software requires that the page length be set from within the software. In such cases, use the value indicated in the second line of the self test print when configuring your software.

Skip Over Perforation

By adjusting the setting of DIP switch 2-3, you can set 1-inch skip over perforation to ON or OFF. If this feature is ON when using continuous paper, the printer skips over the perforation and provides a one-inch margin between the last printed line on one page and the first printable line on the next page. This feature is very convenient if your application program does not provide for top and bottom margins.

To ensure that the perforation is located exactly in the middle of the region skipped, set the page length correctly, then adjust the loading position to the point that is one half the skip size height from the loading edge of the paper.

DIP SW2-3 OFF (Skip over perforation OFF)

```
abcdefghijklmnopqrstuvwxyz{|}~ !"#$%
bcdefghijklmnopqrstuvwxyz{|}~ !"#$%&
cdefghijklmnopqrstuvwxyz{|}~ !"#$%&'
defghijklmnopqrstuvwxyz{|}~ !"#$%&'(
efghijklmnopqrstuvwxyz{|}~ !"#$%&'()
fghijklmnopqrstuvwxyz{|}~ !"#$%&'()*
ghijklmnopqrstuvwxyz{|}~ !"#$%&'()*+
hijklmnopqrstuvwxyz{|}~ !"#$%&'()*+,
ijklmnopqrstuvwxyz{|}~ !"#$%&'()*+,-
jklmnopqrstuvwxyz{|}~ !"#$%&'()*+,-.
```

DIP SW2-3 ON (Skip over perforation ON)

```
abcdefghijklmnopqrstuvwxyz{|}~ !"#$%
bcdefghijklmnopqrstuvwxyz{|}~ !"#$%&


cdefghijklmnopqrstuvwxyz{|}~ !"#$%&'
defghijklmnopqrstuvwxyz{|}~ !"#$%&'(
efghijklmnopqrstuvwxyz{|}~ !"#$%&'()
```

The skip over perforation setting can be set to values other than one inch by using the ESC N command. See the Command Summary in Chapter 10 for details.

Adjusting the Loading Position

The loading position

The loading position is the position of the paper when it has been automatically loaded by the printer.

The loading position is important because it determines where the printing begins on the page. If the printing is too high or too low on the page, change the loading position using the micro adjustment feature described below.

Never use the platen knob for paper feeding except in case of a paper jam or other paper feeding problem. (When using the platen knob, the power must be off.) If you need to adjust the loading position, always use the micro adjustment feature.

Unless a new loading position is set, the printer will remember the previously set (or default) loading position and use it as a reference point for feeding the paper.

The micro adjustment feature can move the paper 2/216th of an inch increments to make fine adjustments to the loading position. Once you have used micro adjustment to change the loading position of *continuous paper*, the printer remembers that position even after it is turned off.

However, when you use micro adjustment to change the loading position of *single sheet* paper, the printer does *not* remember this position after the power is turned off. When the power is turned back on, the loading position returns to its factory setting.

Using micro adjustment

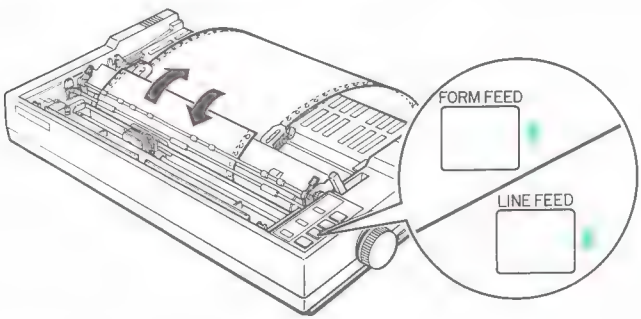
Before adjusting the loading position using the micro adjustment feature, make sure that:

- The printer is turned on.
- Single sheet/continuous paper is ready to be loaded.

1. Press the LOAD/EJECT button to feed paper to the loading position. Then press the ON LINE button; the ON LINE light then begins to flicker.

You can only use the FORM FEED and LINE FEED buttons for micro adjustment while the ON LINE light is flickering.

2. Press the FORM FEED button to feed the paper forward or the LINE FEED button to feed the paper backward.



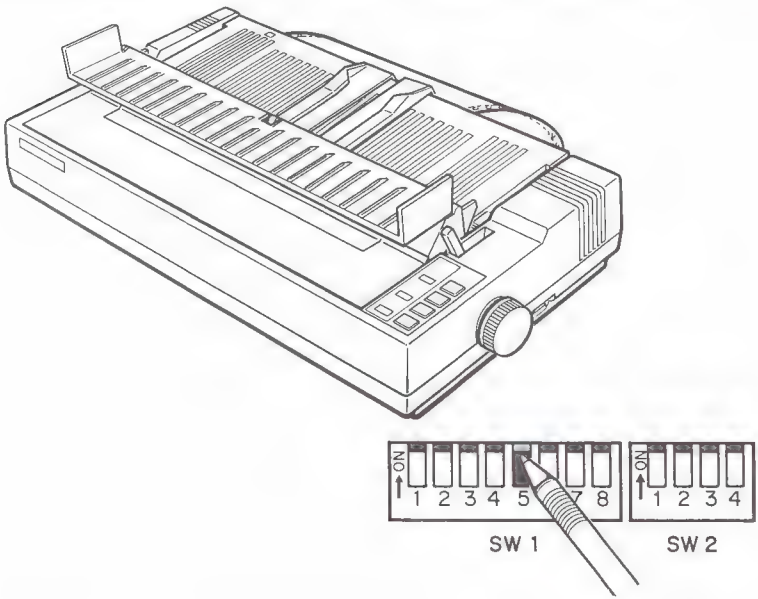
When the paper reaches the factory-set loading position, the printer beeps and micro adjustment feeding pauses for a moment before continuing. You can use this factory setting as a reference point when adjusting the printer's loading position. When the paper reaches either the minimum or maximum top margin, the printer beeps and the paper stops moving.

Using Short Tear-Off

The short tear-off function

When you are finished printing, the short tear-off feature automatically feeds the perforation of the continuous paper to the tear-off edge of the sheet guide cover so that you can tear off the last sheet. When you resume printing, the paper feeds backward to the loading position. This feature lets you save the paper normally lost between documents, and is especially beneficial when using preprinted business forms.

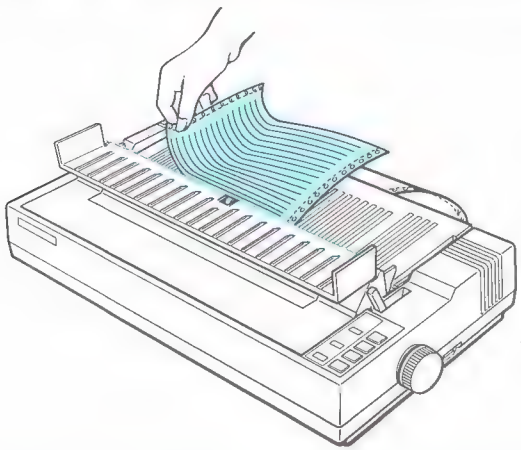
To use this feature, set DIP switch 1-5 to OFF. Then, load continuous paper in the normal way, but leave the paper guide cover open so that you can use the guide's tear-off edge.



You can leave the short tear-off feature turned on (DIP switch 1-5 OFF) even when you are using single sheets. When you move the paper release lever to the single sheet position, short tear-off is disabled.

Never use the short tear-off feature with labels.

If the printing is completed and no more data is sent, the perforation at the end of the last printed page feeds to the tear-off edge of the paper guide cover. You can then tear off the page using the tear-off edge. (If the page perforation is not properly aligned with the tear-off edge, you can adjust the tear-off position with micro adjustment feature as described below.)



Short tear-off is not performed unless printing of a page is completed and the next print position is the first line of the next page. After checking this, press the ON LINE button to put the printer off line, then press the FORM FEED button. Paper is fed to the tear-off position when you put the printer back on line.

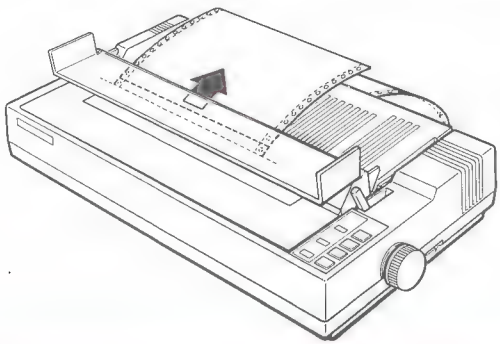
When you resume printing after tearing off the sheet, the paper automatically feeds backward to the loading position before printing begins.

Adjusting the tear-off position using micro adjustment

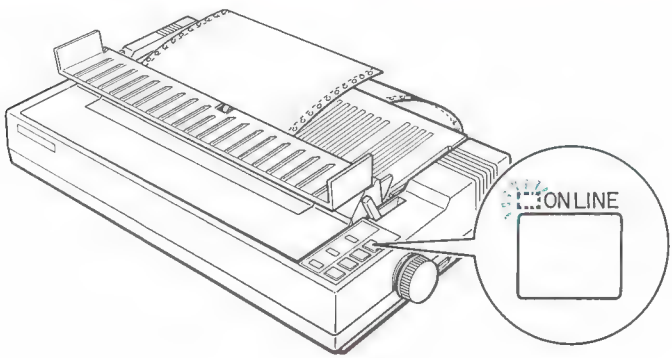
Sometimes the perforation may not meet the tear-off edge. If this happens, you can adjust the tear-off position using micro adjustment.

Before adjusting the tear-off position, make sure that:

- The printer feeds paper to the tear-off position after printing the document.

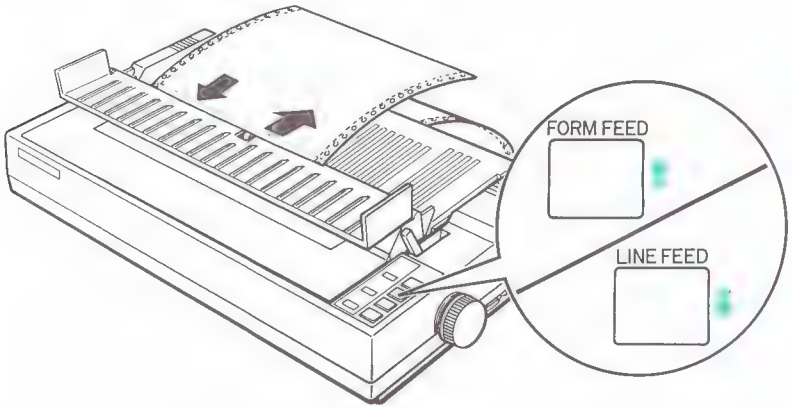


1. See that the ON LINE light is flickering.



You can only use the micro adjustment feature while this light is flickering.

2. To make fine adjustments to the tear-off position, press the FORM FEED button to feed the paper forward or the LINE FEED button to feed it backward.



Adjustment of the tear-off position is now complete. You can tear off your document from the perforation and resume printing. This new tear-off position is remembered by the printer, and remains valid even after the printer is turned off and then on again.

Selecting Typestyles

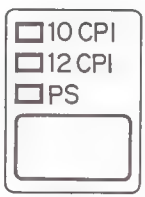
Your printer can produce a wide range of typestyles by combining different character fonts, pitches, widths, and other enhancements which can be selected using the SelecType feature on your control panel or using software commands. This section describes only the features controlled by SelecType. To use software commands, see the Command Summary in Chapter 10.

Using SelecType

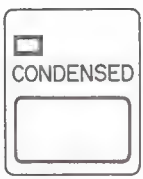
You can use the SelecType section of the control panel to choose fonts, pitches, and condensed printing. Yellow lights indicate which features you have chosen.

To select a feature, press each button until the yellow light goes on next to the desired mode.

Font



Pitch



Condensed

The settings you select using the SelecType panel remain valid even after the printer is turned off. However, some application programs are designed to control all typestyle functions. These programs cancel all previous typestyle settings by sending certain software commands before printing. Because these commands cancel SelecType settings, you should use the program's print options function instead of SelecType to select your typestyles. Therefore, if SelecType does not work with a particular application, consult its manual on how to select typestyles.

Character fonts

This printer has four built-in character fonts:

HIGH SPEED DRAFT

We've just seen your excellent ad for **miniature zebras** in a recent back issue of Trader's Times. What is the price schedule for quantities over one gross?

NORMAL DRAFT

We've just seen your excellent ad for **miniature zebras** in a recent back issue of Trader's Times. What is the price schedule for quantities over one gross?

ROMAN

We've just seen your excellent ad for **miniature zebras** in a recent back issue of Trader's Times. What is the price schedule for quantities over one gross?

SANS SERIF

We've just seen your excellent ad for **miniature zebras** in a recent back issue of Trader's Times. What is the price schedule for quantities over one gross?

High speed draft is ultra-fast, making it ideal for rough drafts and other preliminary work. Normal draft is a bit slower, but offers higher resolution characters.

ROMAN and SANS SERIF are Near Letter Quality (NLQ) fonts. Near Letter Quality takes a little longer to print, but produces nicely-formed characters suitable for most documentation requirements.

Character pitch

For each of the three built-in fonts, you can choose a character pitch of 10 or 12 characters per inch (cpi), or proportional spacing.

The following printout compares the different pitches.

10 CPI:

```
This is 10 CPI printing.
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
```

12 CPI:

```
This is 12 CPI printing.
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
```

Proportional:

```
This is proportional printing.
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
```

In the 10 and 12 cpi modes, each character is given the same amount of space. However, in the proportional mode, width varies from character to character. Therefore, a narrow letter like i receives less space than a wide letter like W.

Proportional printing cannot be condensed.

Condensed mode

In addition to the two pitches and proportional spacing, you can use the condensed mode to change the character size. In the condensed mode, characters are approximately 60% of the width of normal characters. Hence, condensed printing is very useful for spreadsheets and other applications where you need to print the maximum amount of information on a page. Both 10 and 12 cpi can be condensed, but proportional cannot.

To select the condensed mode, simply press the CONDENSED button so that the yellow indicator light comes on. To turn off the condensed mode, press the button again.

The following printout compares normal 10 and 12 cpi with condensed 10 and 12 cpi.

```
This is 10 CPI printing.
This is condensed 10 CPI printing.
This is 12 CPI printing.
This is condensed 12 CPI printing.
```

Selecting an International Character Set

Selection of an international character set provides you with the characters and symbols used in other languages. In the Epson ESC/P mode, you can select one of eight international character sets by DIP switches. In the IBM emulation mode, you can select character set that include international characters.

Whenever the printer is turned on, reset or initialized, the character set selected by the DIP switches becomes the default character set.

Epson ESC/P mode (DIP switch 1-4 OFF)

When selecting an international character set, set DIP switches 1-6, 1-7, and 1-8 according to the table below.

This table shows the characters which differ in each international character set.

Country	ASCII code hex												DIP SW		
	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E	1-6	1-7	1-8
0 U.S.A.	#	$	@	[	\	]	^	`	{	¦	}	~	ON	ON	ON
1 France	#	$	à	°	ç	§	^	`	é	ù	è	¨	ON	ON	OFF
2 Germany	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß	ON	OFF	ON
3 U.K.	£	$	@	[	\	]	^	`	{	¦	}	~	ON	OFF	OFF
4 Denmark 1	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~	OFF	ON	ON
5 Sweden	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü	OFF	ON	OFF
6 Italy	#	$	@	°	\	é	^	ù	à	ò	è	ì	OFF	OFF	ON
7 Spain 1	₧	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~	OFF	OFF	OFF

To change the setting of a DIP switch, first turn off the printer, change the DIP switch setting, and then turn the printer back on.

In addition to the eight DIP-switch selectable character sets shown above, the five international character sets shown below are also available by use of a software command. For more information, refer to the ESC R command in Chapter 10.

Country	ASCII code hex											
	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
8 Japan	#	$	@	[	¥	]	^	`	{	¦	}	~
9 Norway	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
10 Denmark II	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
11 Spain II	#	$	á	¡	Ñ	¿	é	`	í	ñ	ó	ú
12 Latin America	#	$	á	¡	Ñ	¿	é	ü	í	ñ	ó	ú

IBM emulation mode (DIP switch 1-4 ON)

In the IBM mode, a character table containing international characters (character table 2) is selected whenever any of DIP switches 1-6, 1-7, or 1-8 are set to OFF. If all of the switches are set to ON, character table 1 becomes effective and these characters are handled as spaces or control codes, rather than as printable characters. See the Appendix for details.

Choosing a Character Table

In the Epson ESC/P mode, DIP switch 1-3 selects the italics character table or the Epson Extended Graphics character table. The Epson Extended Graphics character table contains international accented characters, Greek characters, mathematic symbols, and character graphics for printing lines, corners, and shaded areas.

If you have an IBM computer or an IBM compatible, select the Epson Extended Graphics table when you wish to print the character graphics as they are displayed on the screen. Since the character table setting only affects the upper half of the character table, you can still print text if you have selected the Epson Extended Graphics set. Also, you can still print italics if you use the proper software command. (See the section on the ESC t and ESC 4 commands in Chapter 10.)

Italic and Epson Extended Graphics tables are shown below.

Italics character table (DIP switch 1-3 OFF)

CODE	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p	à	§		*0*	*@*	*P*	`	*p*
1			!	1	A	Q	a	q	è	ß	!	*1*	*A*	*Q*	*a*	*q*
2			"	2	B	R	b	r	ù	Æ	"	*2*	*B*	*R*	*b*	*r*
3			#	3	C	S	c	s	ò	æ	#	*3*	*C*	*S*	*c*	*s*
4			$	4	D	T	d	t	ì	ø	$	*4*	*D*	*T*	*d*	*t*
5			%	5	E	U	e	u	°	ø	%	*5*	*E*	*U*	*e*	*u*
6			&	6	F	V	f	v	£	¨	&	*6*	*F*	*V*	*f*	*v*
7			'	7	G	W	g	w	¡	Ä	'	*7*	*G*	*W*	*g*	*w*
8			(	8	H	X	h	x	¿	Ö	(	*8*	*H*	*X*	*h*	*x*
9			)	9	I	Y	i	y	Ñ	Ü	)	*9*	*I*	*Y*	*i*	*y*
A			*	:	J	Z	j	z	ñ	ä	*	*:*	*J*	*Z*	*j*	*z*
B			+	;	K	[	k	{	¤	ö	+	*;*	*K*	*[*	*k*	*{*
C			,	<	L	\	l	¦	Å	ü	,	*<*	*L*	**	*l*	*¦*
D			-	=	M	]	m	}	Â	É	-	*=*	*M*	*]*	*m*	*}*
E			.	>	N	^	n	~	â	é	.	*>*	*N*	*^*	*n*	*~*
F			/	?	O	_	o		Ç	¥	/	*?*	*O*	*_*	*o*	*Ø*

Epson Extended Graphics character table (DIP switch 1-3 ON)

CODE	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	p	Ç	É	á	▒	└	╨	α	≡
1			!	1	A	Q	a	q	ü	æ	í	▒	┴	╤	β	±
2			"	2	B	R	b	r	é	Æ	ó	▒	┬	╥	Γ	≥
3			#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤
4			$	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ	⌠
5			%	5	E	U	e	u	à	ò	Ñ	┼	┼	╒	σ	⌡
6			&	6	F	V	f	v	ª	û	º	╞	╞	╓	µ	÷
7			'	7	G	W	g	w	ç	ù	¤	╟	╟	╫	τ	≈
8			(	8	H	X	h	x	ê	ÿ	¿	╚	╚	╪	Φ	°
9			)	9	I	Y	i	y	ë	Ö	⌐	╔	╔	┘	Θ	∙
A			*	:	J	Z	j	z	è	Ü	¬	╩	╩	┌	Ω	·
B			+	;	K	[	k	{	ï	¢	½	╦	╦	■	δ	√
C			,	<	L	\	l	¦	î	£	¼	╠	╠	▄	∞	n
D			−	=	M	]	m	}	ì	¥	¡	═	═	▌	ø	2
E			.	>	N	^	n	~	Ä	₧	«	╬	╬	▐	∈	■
F			/	?	O	_	o		Å	ƒ	»	┐	╧	▀	∩	

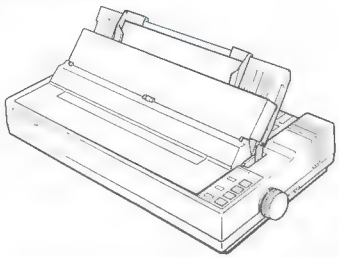
To change the setting of a DIP switch, first turn off the printer, change the DIP switch, and then turn the printer back on.
Use of the ESC 6 or ESC 7 command lets you select whether to print hex codes 80 to 9F and FF as characters (ESC 6) or control codes (ESC 7). For the IBM emulation mode, see Appendix.

Data Dump Mode

This printer is equipped with a special feature which makes it easy for experienced users to identify the source of communications problems between the printer and computer. In the data dump mode, an exact printout of the codes reaching the printer is produced.

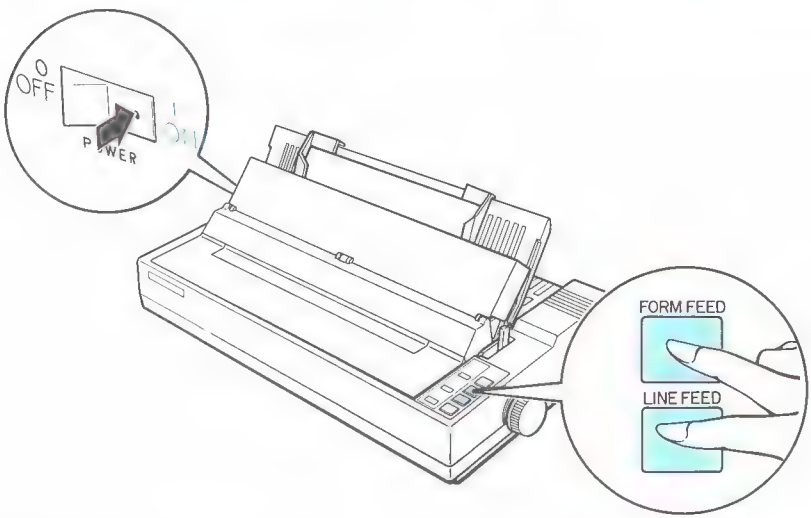
Before entering the data dump mode, make sure that:

- Paper is loaded.
- The printer is turned off.



Either the tractor unit or cut sheet feeder may be used for printing in the data dump mode.

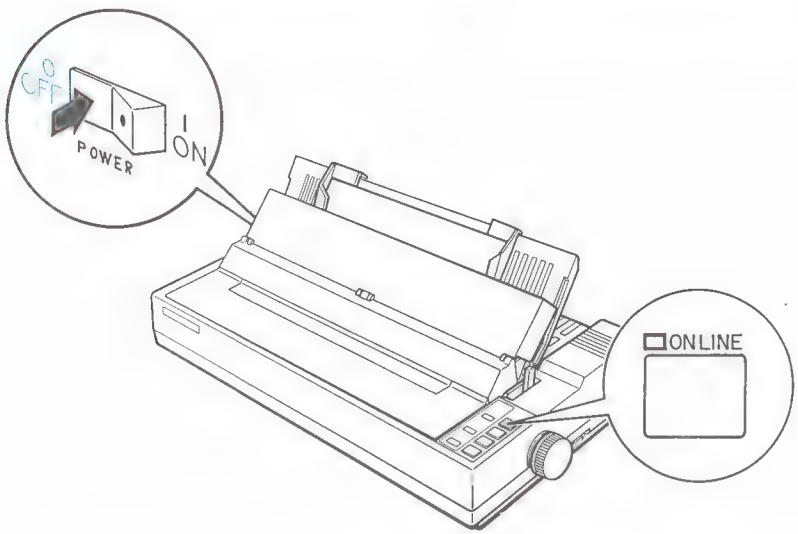
1. To enter the data dump mode, hold down the FORM FEED and LINE FEED buttons at the same time, while you turn on the printer.



2. Run either an application program or one you have written in any programming language. Your printer prints out all the codes sent to the printer in hexadecimal format as shown below.

```
Data Dump Mode
0000  1B 40 1B 52 00 1B 74 01 1B 36 12 1B 50 1B 70 00   .@.R..t..6..P.p.
0001  20 20 54 68 69 73 20 69 73 20 61 6E 20 65 78 61     This is an exa
0002  6D 70 6C 65 20 6F 66 20 61 20 64 61 74 61 20 64   mple of a data d
0003  75 6D 70 20 70 72 69 6E 74 6F 75 74 2E 0D 0A 20   ump printout...
0004  54 68 69 73 20 66 65 61 74 75 72 65 20 6D 61 6B   This feature mak
0005  65 73 20 69 74 20 65 61 73 79 20 66 6F 72 20 79   es it easy for y
0006  6F 75 20 74 6F 20 66 69 6E 64 20 6F 75 74 0D 0A   ou to find out..
0007
```

3. To turn off the data dump mode and stop the printing, press the ON LINE button to set the printer off line. Next, turn off the printer.



By comparing the characters printed in text field on the right side of the data dump printout (see Step 2) with the printout of hex codes, you can check what codes are being sent to the printer. If characters are printable, they appear as their true ASCII characters. Non-printable codes, such as control codes, are represented by dots.

In the example given, the data dump printout can be interpreted by examining the first three hex codes on the second line of the printout sample (20 20 54). Each hex code (20) represents a space; while the hex code 54 represents the letter T. Check the second line of the text field in the right side of the printout and you will find the letter T preceded by two spaces.

The chart below interprets the first seven non-printable codes:

Hex codes	Command	Function
1B 40	ESC @	Initialize printer
1B 52 00	ESC R 0	Select USA character set
1B 74 01	ESC t 1	Select Epson Extended Graphics character
1B 36	ESC 6	Enable printable characters
12	DC2	Cancel condensed mode
1B 50	ESC P	Select 10 pitch
1B 70 00	ESC p 0	Cancel proportional mode

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Enhancing Your Printing

You can obtain many different printing effects with the FX printer, from arranging the printout on the paper to giving extra emphasis to particular words and phrases. This section shows you the features you may want to select with your software.

For software control of these features, see the instructions for your applications program or look up their specific commands in the command summary in Chapter 10.

Quality and fonts

The most fundamental changes you can make to printing on the FX are in the print quality and NLQ fonts.

The FX has three levels of print quality: high speed draft, normal draft and NLQ (Near Letter Quality). High speed draft is ultra-fast, making it ideal for rough drafts and other preliminary work. Normal draft is a bit slower, but offers higher resolution characters. Finally, NLQ printing takes a little longer, but it produces more fully-formed characters for presentation-quality documents.

The printout below shows the differences between high speed draft, normal draft, NLQ Roman, and NLQ Sans Serif so that you can compare the different styles and densities:

```
Draft printing is fast.
High speed draft is even faster.
NLQ Roman is clear and typewriter-like.
NLQ Sans Serif is crisp and distinctive.
```

SelecType gives you and easy way of changing the print quality and NLQ font.You can also choose the print quality and NLQ font with software commands.

High speed draft is only available when 10 pitch printing is selected. The only print enhancements that can be combined with high speed draft are underline and double-strike. If other enhancements or character sizes are selected, high speed draft is ignored and replaced by normal draft.

Character pitch

To add greater variety to your documents, the FX has two pitches as well as proportional spacing. All three can be selected with a software command, or by SelecType (see Chapter 3).

For each of the three built-in fonts, you can choose a character pitch of 10 or 12 character per inch (CPI), or proportional spacing. This printout below compares the two pitches:

```
10 CPI: ABCDEFGHIJKLMnopqrstuvwxyz
12 CPI: ABCDEFGHIJKLMnopqrstuvwxyz
```

In 10 and 12 pitch, each character is given the same amount of space. The width of proportional spacing, however, varies from character to character. Therefore, a narrow letter like i received less space than a wide letter like W. The width of each proportional character is given in the Appendix.The following printout compares 10 pitch spacing with proportional spacing:

```
      10 CPI: ABCDEFGHIJKLMnopqrstuvwxyz
Proportional: ABCDEFGHIJKLMnopqrstuvwxyz
```

Character size

In addition to the basic pitches and proportional spacing, the FX offers three other modes that can change the size of your printing. These modes are double-width, double-height, and condensed.

The double-width mode doubles the width of any size of characters; while the double-height mode double the height of the size of character. These modes are useful for emphasizing headings in reports and making displays, but are usually not suitable for large amounts of text. These modes can also be combined to obtain even more impressive printing results.

```
This is normal 10 pitch printing.
This is double-width.
This is double-height.
This is double-width
    and double-height.
```

Both 10 and 12 pitch printing can be reduced to about 60% of their normal width using the condensed mode. This mode is particularly useful for printing wide spreadsheets because condensed 12 pitch allows you to print up to 160 characters on an 8-inch line.

Condensed can be selected with a software command, or by SelecType (see Chapter 3). Even if you turn condensed on with SelecType you can still turn it off with a software command.

```
Condensed 10 cpi gives more characters on a line.
Condensed 12 cpi gives you even more.
```

Widening or narrowing the characters also widens or narrows the spaces between words and letters. Because word processors usually create a left margin by printing spaces, you may need to change the number of characters on a line to keep the margins correct if you change widths.

Special effects and emphasis

The FX has a number of features for those extra effects required either for emphasis or for special printing requirements. These features can be controlled directly by software commands. Many application programs can also produce these effects. Refer to your applications program for details.

Emphasized and double-strike printing

Emphasized and double-strike give your printing added emphasis. In emphasized mode, the FX prints each character twice as the print head moves across the paper, with the second dot printed slightly to the right of the first. This process produces darker, more fully formed characters.

In double-strike mode, the print head goes over each line twice, making the text bolder. For even greater boldness, emphasized and double-strike can be combined. Double-strike is not available in the NLQ mode. The following samples show the different effects you can achieve both alone and in combination.

```
This is draft printing: with emphasized,
                        with double-strike,
                        and with both.
```

Italic printing

The printing of italic characters can be selected by using the ESC 4 command. If you are using Epson italic character table, you can also print italic characters by sending the corresponding codes. A sample of italic printing is shown below.

```
Italic give emphasis to words.
They are an attractive alternative words.
```

Underlining

The underline mode provides an automatic way of fully underlining any piece of text. It underlines spaces, subscripts, and superscripts without a break. Most word processors take advantage of this feature, but some programs use the underline character instead. If this happens check your program for an underlining option.

This is continuous underlining.

Superscripts and subscripts

Superscripts and subscripts can be used for printing footnote numbers and mathematical formulas. The example below shows underlining, superscripts, and subscripts combined in a mathematical formula.

$$\text{average} = \frac{(a_1 + a_2 + \ldots + a_n)}{n}$$

Selecting typestyles with Master Select

Your printer has a special command called Master Select that allows you to choose many possible combinations of nine different modes.

The format of the Master Select command is:

ESC ! *n*

The variable n is a number that identifies the typestyle or combination. To find the value of *n*, refer to the table below and add up either the decimal or hexadecimal numbers for the features you want.

Feature	Dec.	Hex.
10 pitch	0	00
12 pitch	1	01
proportional	2	02
condensed	4	04
emphasized	8	08
double-strike	16	10
double-width	32	20
italics	64	40
underline	128	80

example:

12 pitch	1
Double-strike	16
Double-width	32
	n=49

For example, you may want to use double-width 12 pitch characters and print them in double-strike mode. You would add three numbers together to calculate the value of *n*.

The print quality and font must be set separately, either using SelecType or the ESC x and ESC k commands. There are two more things to consider when using the Master Select command:

- Master Select cancels any of the listed features that you do not try to set. For example, if you have already set italic mode, and you try to use Master Select to set emphasized double-strike, the italic mode is canceled.
- Proportional overrides 10 and 12 pitch, and condensed.

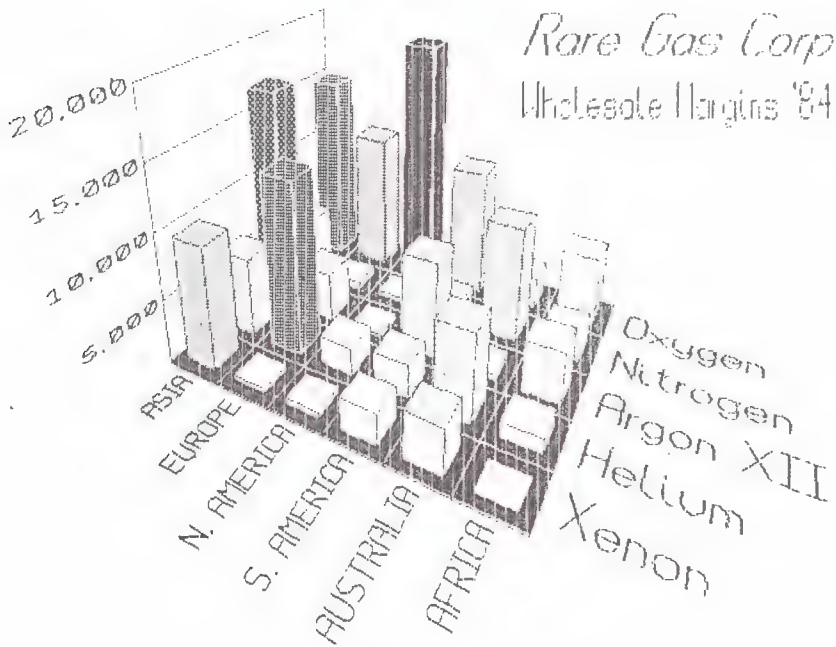
Graphics

The dot graphics mode allows your printer to produce pictures, graphs, charts, or almost any other pictorial material you can devise.

Because many commercial software programs use graphics, you may be able to print pictures and graphs like the ones on this page and the next by simply giving your software a few instructions.

The quickest and easiest way to print graphics on your printer is to use a commercial graphics program. With such programs you usually create an image on your monitor and then give a command to send the image to the printer.

If you use commercial software that produces graphics, all you need to know about dot graphics is how to use the software. If, on the other hand, you wish to do your own programming or merely wish to understand how the printer prints graphics, read on.



The print head

To understand dot graphics you need to know a little about how your printer's print head works.

The FX's print head has nine pins. As it moves across the page, electrical impulses cause the pins to fire. Each time a pin fires, it strikes the inked ribbon and presses it again the paper to produce a small dot. As the head moves across the paper, the pins fire time after time in different patterns to produce letters, numbers, or symbols.

Dot patterns

The FX's print head is able to print graphics in addition to text because graphic images are formed on the FX about the same way that pictures in newspapers and magazines are printed.

If you look closely at a newspaper photograph, you can see that it is made up of many small dots. The FX also forms its images with patterns of dots, as many as 240 dot positions per inch horizontally and 72 dots vertically. The images printed by the FX can, therefore, be as finely detailed as the ones at the beginning of this section.

In its main graphics mode the FX prints one column of dots for each code it receives, and it uses only the top eight of the nine pins. Therefore, your graphics program must send codes for dot patterns, one number for each column in a line. For each of those columns the print head prints the pattern of dots you have specified.

To print figures taller than eight dots, the print head makes more than one pass. The printer prints one line, then advances the paper and prints another, just as it does with text.

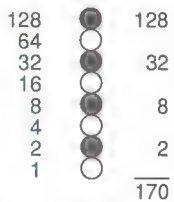
To keep the print head from leaving gaps between the graphics lines as it does between the text lines, the line spacing must be changed to eliminate the space between lines, each no more than 8/72nds of an inch tall.

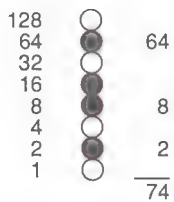
Pin labels

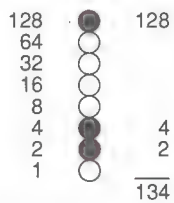
The graphics mode requires a method to tell the printer which pins to fire in each column. Since there are 256 possible combinations of eight pins, you need a numbering system that allows you to use a single number to specify which of the 256 possible patterns you want. This numbering system is shown in the following figure:

To fire any one pin, you send its number. To fire more than one pin at the same time, add up the numbers of the pins and send the sum to the printer. Therefore, with these labels for the pins, you fire the top pin by sending 128. To fire the bottom pin, you send 1. If you want to fire only the top and bottom pins, you simply add 128 and 1, then send 129.

By adding the appropriate label numbers together, you can fire any combination of pins. Below are shown three examples of how to calculate the number that will fire a particular pattern of pins.







With this numbering system, any combination of the eight pins adds up to a decimal number between 0 and 255, and no numbers are duplicated. Before you can put these numbers in a graphics program, however, you need to know the format of the graphics commands.

The graphics command

The graphics mode command is quite different from most other commands. For most of the other modes, such as emphasized and double-width, one command turns the mode on and another turns it off. For graphics, the command is more complicated because the command that turns on a graphics mode also specifies how many columns of graphics will be printed. After the printer receives this command, it interprets the next numbers as pin patterns and prints them on the paper.

Your printer has one command that allows you use any of the eight graphics options. The format of the command is:

ESC * *m n1 n2* data

In this commands, *m* selects the graphics option and *n1* and *n2* specify the number of columns to reserve for graphics. The available graphics options are listed below.

Option	*m*	Horiz. density (dots/in.)
Single-density	0	60
Double-density	1	120
High-speed double-density*	2	120
Quadruple-density*	3	240
CRT I	4	80
Plotter (1:1)	5	72
CRT II	6	90
Double-density plotter	7	144

*Adjacent dots cannot be printed in this mode.

Column reservation numbers

Even in single-density graphics mode, one 8-inch line can accommodate 480 columns of graphics; in quadruple-density, almost 2000 columns can fit on the same 8-inch line. Since the printer does not use decimal numbers larger than 255, the graphics commands use two numbers for reserving columns.

To figure *n1* and *n2*, divide the total number of columns by 256. The result is *n2*; the remainder is *n1*. Since the command is set up for two numbers, you must supply two even if you need only one. When you need fewer than 256 columns, just make *n1* the number of columns you are reserving and make *n2* a zero.

For example, if you wish to send 1632 columns of graphics data, *n1* should be 96 and *n2* should be 6 because $1632 = 96 + (6 \times 256)$.

The printer will interpret the number of bytes determined by *n1* and *n2* as graphics data, no matter what codes they are. This means that you must be sure to supply enough bytes of graphics data or the printer will stop and wait for more data and will seem to be locked. If, on the other hand, you supply too much graphics data, the excess will be interpreted and printed as regular text.

A simple graphics programming

This first program, is just a simple example to show you how the graphics command, column reservation numbers, and data can be used in a BASIC program.

Type in and run the following program; be especially careful to include both semicolons. The program produces the printout you see below it.

```
10  WIDTH "LPT1:",255
20  LPRINT CHR$(27)"*"CHR$(0)CHR$(40)CHR$(0);
30  FOR X=1 TO 40
40  LPRINT CHR$(170);
50  NEXT X
```

Line 20 selects single-density graphics mode and also reserves 40 columns for graphics. Line 30 begins a loop to supply 140 bytes of data. Line 40 contains the number 170, which produces the first pin pattern shown in the section on pin labels, and line 50 finishes the loop.

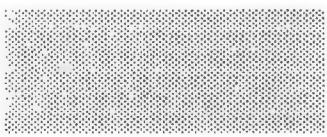
Printing taller patterns

The next example shows how several lines of graphics can be formed into a figure taller than eight dots. It uses programming techniques for producing textured or repetitive patterns.

The program is listed below. The line inside each pair of FOR and NEXT statements have been indented so that you can see how the program works; the spaces are not needed for the program to run.

```
100 WIDTH "LPT1:", 255
110 LPRINT CHR$(27);"A";CHR$(8);
120 FOR R = 1 TO 6
130     LPRINT CHR$(27);"K";CHR$(100);CHR$(0);
140     FOR X = 1 TO 50
150         LPRINT CHR$(170);CHR$(85);
160     NEXT X: LPRINT
170 NEXT R
180 LPRINT CHR$(27);"@"
```

If you run the program, you will see how it combines six print lines into a pattern.



There are five basic steps that the program goes through to produce this kind of pattern.

1. The computer is prevented from adding any extra characters by the WIDTH statement (line 100).

WIDTH statement
Some software (including most versions of BASIC) automatically inserts carriage return and line feed codes after every 80 or 130 characters. This is usually no problem with text, but it can spoil your graphics. Two extra columns of graphics are printed in the middle of the ones you send, and are left over and printed as text.
In some versions of BASIC you can prevent unwanted control codes in graphics by putting a WIDTH statement at the beginning of all graphics programs. The format in many forms of BASIC is either WIDTH "LPT1:",255 or WIDTH LPRINT 255. Check your software manual for the proper format.

2. The line spacing is changed to 8/72 of an inch--the height of the dot patterns used in the program (line 110).

3. The program goes through the graphics commands the required number of times (line 120 and 170).

4. A new graphics command is used for each line printed (line 130-160). This part of the program is similar to the last example, but two columns are printed each time through the loop making a total of 100.

5. The last important thing to do is to reset the printer to its default settings, including the normal line spacing (line 180).

   Notice that the graphics command (ESC K) can be in effect for only one print line. To print more than one line of graphics, the graphics command must be issued before each line.

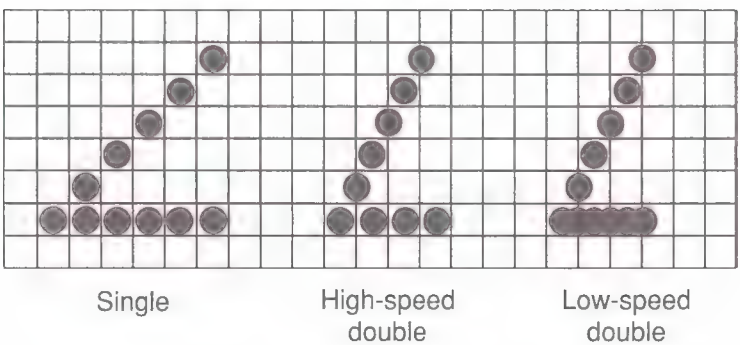
Designing your own graphics

This section takes you through the development of a graphics program. The example is not especially complicated, but it does include the same steps you would use for a more complex figure.

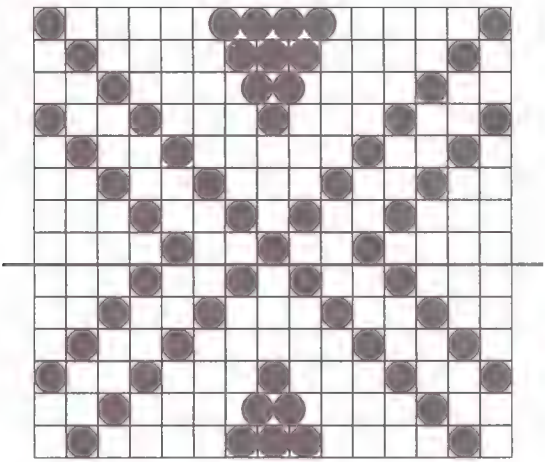
You should plan your figure with dots on graph paper, but before beginning to place the dots, you must decide which graphics density you want. The following figure shows the differences between three common modes so that you can choose the one you want.

In this figure you can see the main rules for graphic design in the three densities:

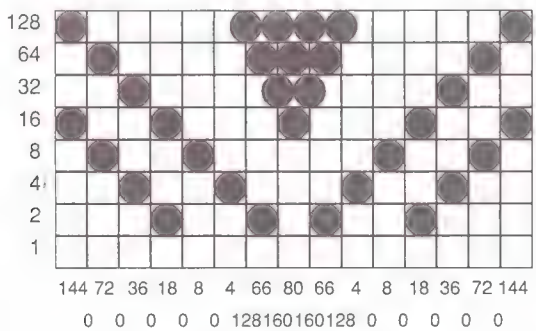
- In single-density no dots can be placed on vertical lines.
- In high-speed double-density, dots can be placed on vertical lines, but no dots can overlap.
- In low-speed double-density, dots can be placed on vertical line, and they can overlap.



Now look at the high-speed double-density design in the following figure. It should point you in the right direction for your own work.



After plotting the dots on a grid, you calculate the numbers for each pin pattern by dividing the design grid into separate print lines. For the design, the grid was divided into two lines, each seven dots high. Then each column was examined to calculate the graphics data. The results for the first line are shown in the following figure. The pin values are on the left and the sums at the bottom of each column.



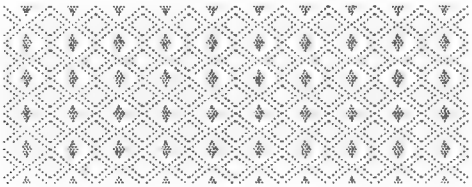
The numbers for the second line were calculated in the same way. Once the numbers for the pin patterns are calculated, they are put in the program in DATA statements, separated by commas.

The program works in a similar way to the last example. This time it selects 7/72-inch line spacing because only seven pins are used. Because the data is not repetitive, each column of graphics data is read from the DATA statements and sent to the printer. The design is 41 dot positions wide. Therefore both lines 130 and 140 use the number 41.

```
100 WIDTH "LPT1:", 255
110 LPRINT CHR$(27);"A";CHR$(7);
120 FOR ROW = 1 TO 2
130 LPRINT CHR$(27);"*";CHR$(1);CHR$(29);CHR$(0);
140 FOR COLUMN = 1 TO 29
150 READ N
160 LPRINT CHR$(N);
170 NEXT COLUMN
180 LPRINT
190 NEXT ROW
200 END
210 DATA 144,0,72,0,36,0,18,0,8,0
220 DATA 4,128,66,160,80,160,66,128,4,0
230 DATA 8,0,18,0,36,0,72,0,144
240 DATA 8,0,18,0,36,0,72,0,144,0
250 DATA 32,0,66,4,138,4,66,0,32,0
260 DATA 144,0,72,0,36,0,18,0,8
```

When you run this program, it produces the following printout:

If you combine several patterns with FOR-NEXT statement, you can also get following printout:



If you want to see the figure in other densities, change the number immediately following the "*" character in line 130 to any number from 0 to 7. Refer to the table on page 4-11 for more information on available print densities.

Individual graphics options commands

There are four individual graphics options commands that are very much the same as the ESC * command, but each one works for only one graphics options. All these four commands are also available in IBM emulation mode. Note that these commands contain one less variable than the ESC * command because they don't need to select a graphics option.

They are shown below:

Command	Function	ESC * Format
ESC K	Single-density	ESC * 0
ESC L	Double-density	ESC * 1
ESC Y	Double-density, high-speed	ESC * 2
ESC Z	Quadruple-density	ESC * 3

The reassigning command

The FX has a command that allows you to change the graphics option assigned to any of the four individual graphics options commands.

The command looks like this:

ESC ? *s m*

The letter *s* represents the command that you wish to change the assignment for (K,L,Y, or Z) and *m* is the number of the graphics option that you want to assign to it. For example, to change the ESC K command to use the CRT I graphics option, the command in BASIC is :

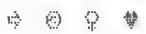
```
LPRINT CHR$(27)"?";"K"CHR$(4)
```

This is a quick way to change the aspect ration of the design that you are printing. Changing the graphics option will change the width without changing the height.

User-defined Characters

With this printer, it is possible to define and print characters of your own design. You can design an entirely new alphabet or typeface, create characters for special applications such as mathematical or scientific symbols, or create graphic patterns with user-defined characters to serve as building blocks for larger designs.

Below you can see samples created with the user-defined character function.



You can make the task of defining characters easier by using a commercial software program that assists you in creating characters or simply supplies you with sets of characters already created. Also, some popular commercial software programs take advantage of the printer's user-defined character function to enhance printouts. (These characters are called download characters in some software programs.)

The standard characters are stored in the printer's Read Only Memory (ROM), and the user-defined characters are stored in the printer's Random Access Memory (RAM).

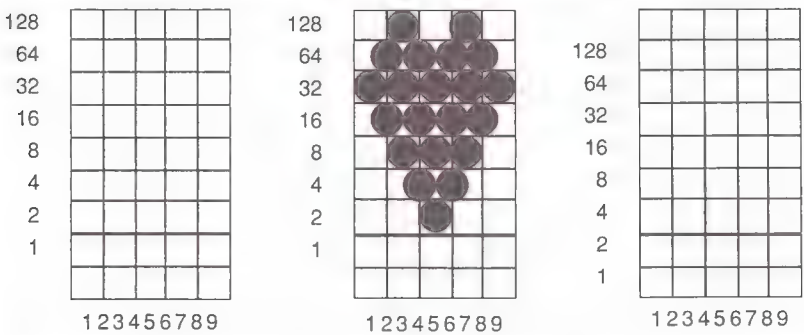
In the Epson ESC/P mode, the user-defined characters are, once defined, saved in non-volatile memory. You can select the user-defined character set by the DIP switch setting (SW1-1) without defining the same characters again. However, characters defined in the IBM emulation mode are cleared whenever the power is turned off or the printer receives the $\overline{\text{INIT}}$ signal.

Designing your characters

User-defined characters are like dot graphics because you send the printer precise instructions on where you want each dot printed. In fact, planning a user-defined character is like planning a small dot graphics pattern.

Design grids

To design a character you use a grid that has nine rows and eleven columns. Following figure shows three of these grids. Most characters do not use the two rows below the heavy line. Those rows are only for characters with descenders, like y and g. Also, even though you can use up to 11 columns, it is best to leave the last two blank for the space between characters.



The grid in the middle of the figure shows a plan for a character. Although there are nine pins in the FX print head, you can use only eight of them in a single user-defined character. The heart design in the figure uses the top eight, but you can also use the bottom eight by using the grid on the right as explained later in this section.

Sending information to your printer

Once the character is planned on the grid, you simply add the pin values for each column together, just as you do for graphics. The next step in defining a character is to send this information to the printer.

The command to define character is complex:

ESC & 0 *n1 n2 a1 a2 d1 . . . dn*

You can define more than one character with a single command. The values *n1* and *n2* are the ASCII codes of the first and last characters you are defining. If you are defining only one character, *n1* and *n2* are the same. You can use any codes between 32 and 127 or 161 and 254 decimal for *n1* and *n2*, but it is best not to define decimal 32, which is the code for a space.

You can also use other codes by using the ESC 6 and ESC I commands (see the Command Summary).

An example will show how to specify *n1* and *n2*. If, for instance, you want to redefine the characters A to Z, *n1* is A (or ASCII code 65) and *n2* is Z (or ASCII code 90). So the command ESC & 0 AZ (followed by the appropriate data) would replace the entire alphabet of capital letters.

Following the specification of the range of characters to be defined in this command is one number (*a1*) that specifies the width of the character and whether it uses the top eight pins or the bottom eight pins. For detail, refer to the following section.

The last part of the character definition is the actual data that defines the dot patterns for each column of each character. Since a character can use up to eleven columns, you must supply eleven data numbers for each character even if some of the columns are blank.

Character definition is not possible if DIP switch 1-1 is set to ON. Be sure to set it to OFF before defining characters.

An example character definition program should make the process clear:

```
110 LPRINT CHR$(27);"&";CHR$(0);
120 LPRINT "@@";
130 LPRINT CHR$(136);
140 FOR I = 1 TO 11
150 READ A: LPRINT CHR$(A);
160 NEXT I
170 LPRINT "@ @ @ @ @"
180 LPRINT CHR$(27);"%";CHR$(1);
190 LPRINT "@ @ @ @ @"
200 LPRINT CHR$(27);"%";CHR$(0);
210 LPRINT "@ @ @ @ @"
220 END
230 DATA 32,80,168,84,42,84,168,80,32,0,0
```

The two at signs (@) in line 120 are n1 and n2, the range of characters being defined (in this case, a range of one). Line 130 contains a1.

The information about the character design (which is contained in the data statements at the end of the program) is sent to the printer in the loop between lines 140 and 160.

Specifying the width and height

The example program uses 136 for *a1* (in line 130 of the definition program), but you can use other values. The number a1 specifies two things: the width of the character and its position on the grid. The width is used when the character is printed in poportional mode.

If you want a character to use the bottom eight pins, use the third grid in the figure on page 4-23.

A value of 136 is suitable for all characters that use the top eight pins and start in column 1 and finsh in column 9. For a character the same width, but printed with the bottom eight pins, *a1* should be 8. For any other character follow these rules to calculate *a1*:

1. If you design a character narrower than nine columns, you can balance the number of empty columns on either side with the following method: Starting with a1 equal to 8, subtract 1 for every blank column on the right and add 16 for every blank column on the left.
2. If the character should be printed with the top eight pins, add 128.

For example, if a character uses the top eight pins and starts in column 3 and ends in column 7, the calculation is as follows:

- start with *a1* = 8
- subtract 2 for two blank columns on the right, giving *a1* = 6
- add 32 for two blank columns on the left, giving *a1* = 38
- add 128 to print with the top eight pins, so that *a1* = 166.

Printing user-defined characters

If you entered the example program above, you defined a heart and placed it in the RAM location for ASCII code 64 (replacing the at sign). You can now print out a three-line sample of your work. The first and third lines (printed by lines 170 and 210 of the program) print the normal at sign; the second line (line 190) prints the heart that you defined.

Run the program to see the printout below.

As you can see, both sets of characters (the original ROM characters that the printer normally uses and the user-defined character set) remain in the printer available for your use. The command to switch between the two sets is used in lines 180 and 210 and has the following format:

ESC % *n*

If *n* is 0, the normal ROM character set is selected. If *n* is 1, the user-defined character set is selected. You can also select one of the two character sets by setting the DIP switch (SW1-1).

You can switch between character sets at any time, even in the middle of a line. To try it, place semicolons at the end of lines 170 and 190 in the program above.

Copying ROM characters to RAM

After running the program above, if you select the user-defined character set and try to print other characters, the only one that will print is the heart. Since no other characters are in the printer's user-defined RAM area, other characters sent to the printer print as spaces.

In many cases, you will want to redefine only a few of the characters to suit your needs; the rest of the alphabet will work fine as it is. As you have seen, it is possible to switch back and forth at will between the normnal character set and the user-defined chatacter set. It is, however, rather inconvenient.

Therefore, your printer has a command which allows you to copy all of the standard characters from ROM to the user-defined character set.

The command format is:

ESC : 0 *n* 0

n determines which NLQ character set (NLQ Roman or Sans serif) in the printer's ROM is copied to RAM area.

This command will cancel any user-defined characters you have already created. You must send this command to the printer before you define characters.
Before sending this command to the printer, check that DIP switch 1-1 is set to OFF.

If you use this command at the beginning of a program, then define your special characters and select the user-defined character set, you can print with the user-defined set as your normal character set. You'll never need to switch back and forth between sets.

Mixing print styles

The user-defined characters can be used in combination with most print styles. For example, emphasized and double-width work well with user-defined characters. The characters you design are enhanced to give these printing effects.

The sample below shows the heart character printed in two different styles.

```
Normal:       ♥♥♥♥♥
Emphasized:   ♥♥♥♥♥
```

The IBM emulation mode has a different method of defining characters. See page 10-45 in the Command Summary if you are interested.

Chapter 5 Using the Printer Options

The Cut Sheet Feeder 5-2
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- Switching from the cut sheet feeder to continuous paper 5-9
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- Installing the board 5-37
- Attaching the upper case 5-41

The Cut Sheet Feeder

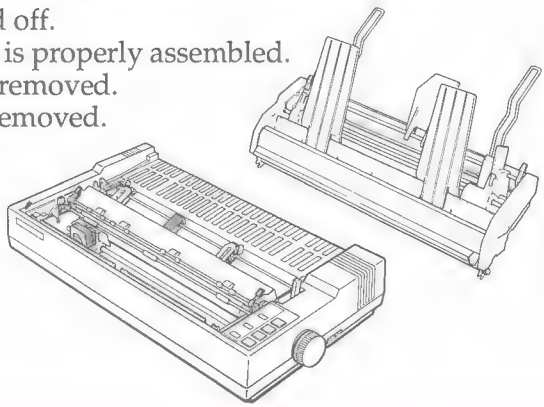
The optional cut sheet feeder makes it possible to handle single-sheet paper more easily and more efficiently. Up to 150 sheets of standard bond paper can be fed automatically into the printer without reloading. This optional unit can also automatically feed envelopes.

Printer	Single bin	Dual bin
FX-850	#7339	#7346
FX-1050	#7340	#7348

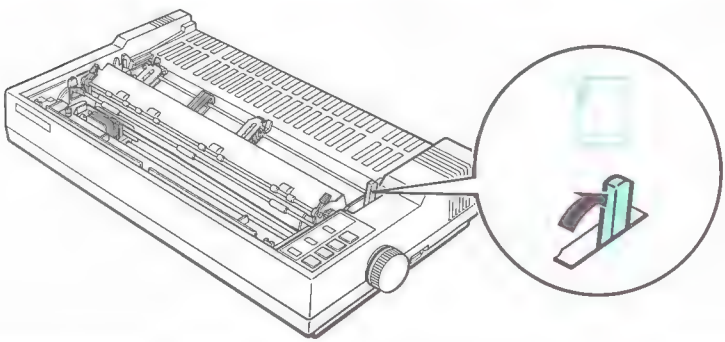
Installation

Before installing the assembled cut sheet feeder, make sure that:

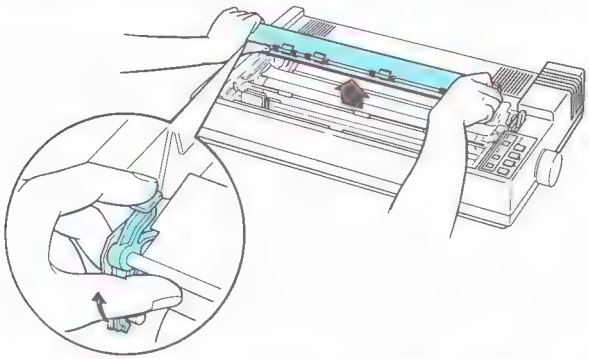
- The printer is turned off.
- The cut sheet feeder is properly assembled.
- The printer cover is removed.
- The paper guide is removed.



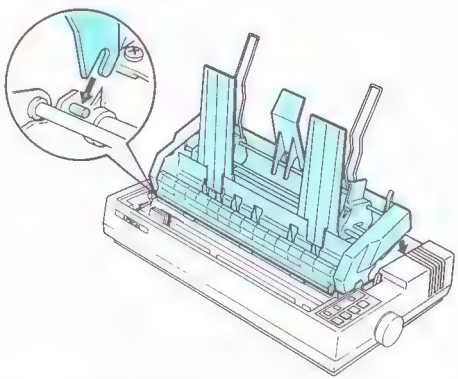
1. Make sure that the paper release lever is pushed all the way back.



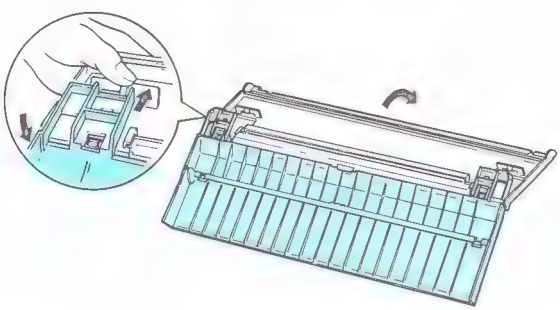
2. Remove the paper tension unit by pressing open the release levers and, at the same time, lifting up on the front of the unit.



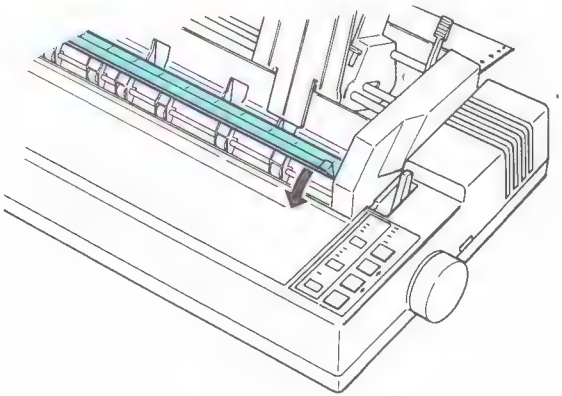
3. Tilt the feeder forward slightly to fit the notches at the base of the unit over the pins on the printer; then tilt the unit back until it rests on top of the printer.



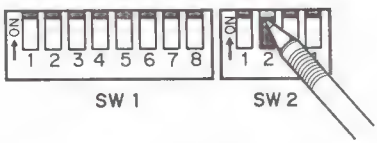
4. Detach the front section of the printer cover.



5. After raising the cut sheet feeder's paper path guide, attach the front cover; then close the paper path guide.



6. Turn on the cut sheet feeder mode by setting DIP switch 2-2 to ON. Then, turn on the power.



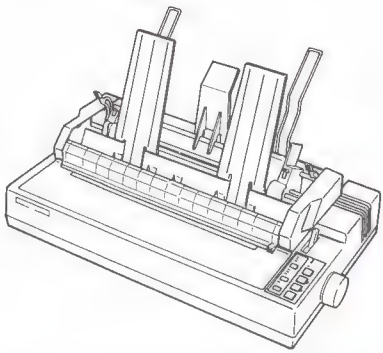
The ESC EM command is a software command used to control the operation of the cut sheet feeder. For more information about this command, see the summary of commands on 10-13.

This completes installation of the cut sheet feeder.

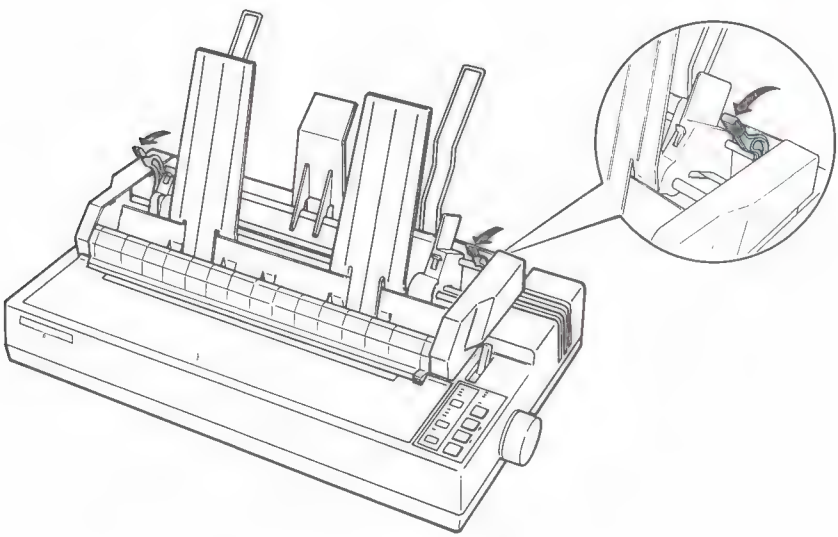
Paper handling

Before loading the paper, make sure that:

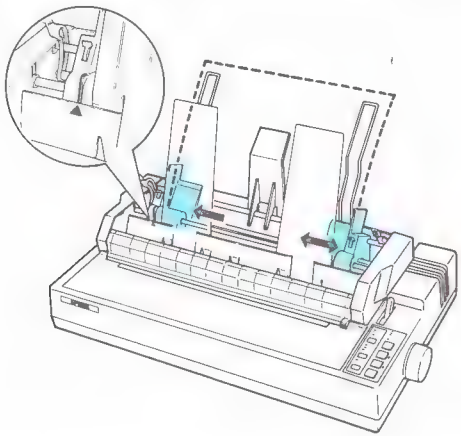
- The printer is turned on.
- The cut sheet feeder is securely installed onto the printer.
- The cut sheet feeder mode is set.



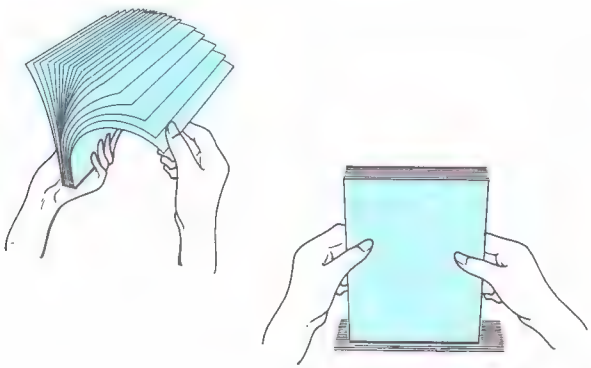
1. Pull the paper set levers all the way forward until the paper supports retract and lock open to allow for paper loading.



2. Slide the left paper guide to where the fin on the edge guide is aligned with the arrow on the metal panel. Next, slide the right paper guide to roughly match the width of your paper.

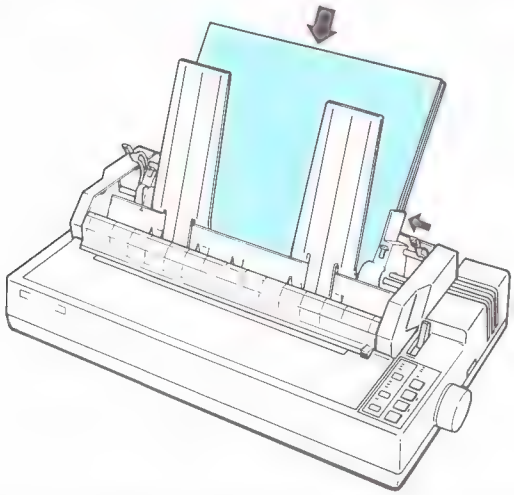


3. Take a stack of paper and fan it as shown. This keeps the paper from sticking so that only one sheet feeds at a time. Tap the side and bottom of the paper on a flat surface to even up the stack.

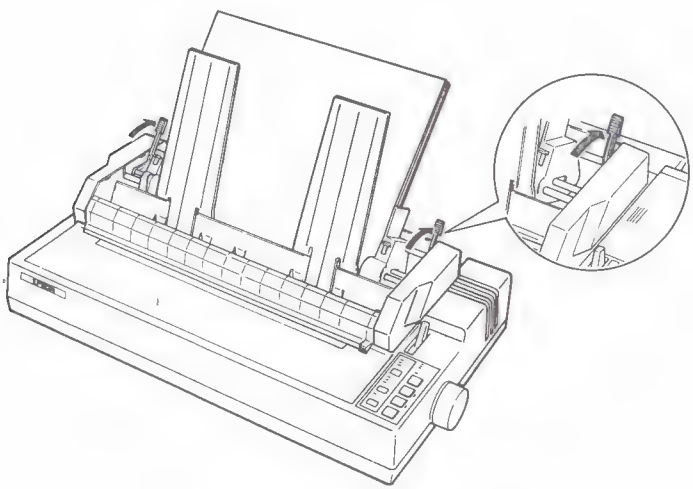


For best results, use typewriter quality paper. If you plan to use paper with a glossy or textured surface, you should test it before regular use. Do not use multi-part forms, carbon paper or labels.

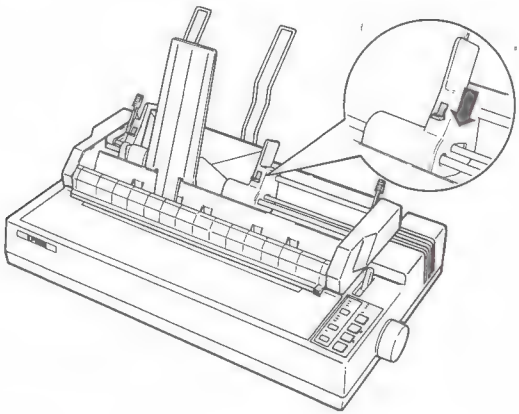
4. Insert the paper between the paper guides, aligning it with the left edge of the guide. Then, adjust the right paper guide until the paper is held firmly, but not so tightly that it causes the paper to bunch. Make sure the paper can move freely up and down.



5. Push the paper set levers back until they click into place and clamp the paper against the guide rollers.

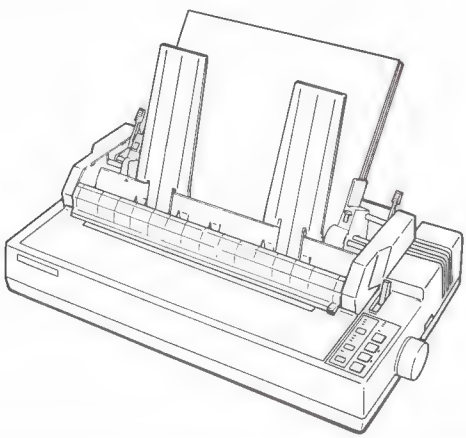


6. Check the position of the two front levers. If you are using envelopes, push down on the two front levers until they lock into position. If you are using normal single sheet paper, make sure that the two levers are in the up position.



If you are using envelopes, you also need to set the paper thickness lever to match the thickness of your envelopes.

This completes loading of paper into the cut sheet feeder.

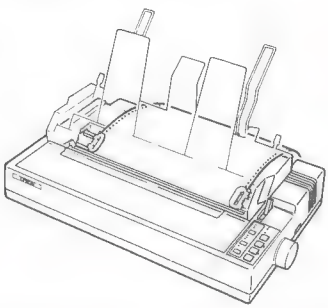


Switching from the cut sheet feeder to continuous paper

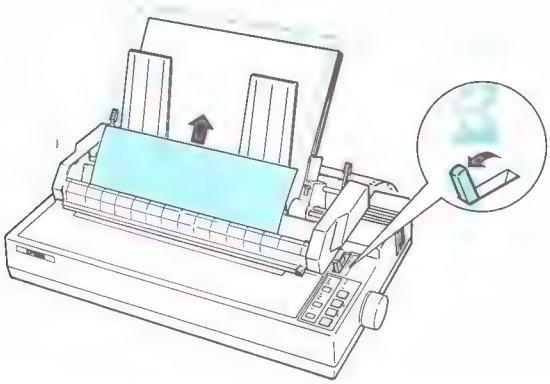
Your printer lets you easily switch between the cut sheet feeder and continuous paper without removing either the feeder or the continuous paper supply. You do not even need to change the printer's DIP switch settings.

Before switching, make sure that:

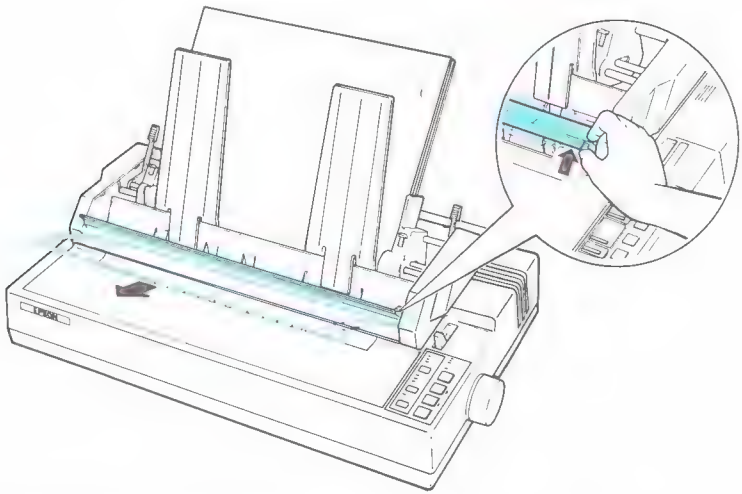
- Continuous paper is already loaded and in the standby position.
- The cut sheet feeder is properly installed.



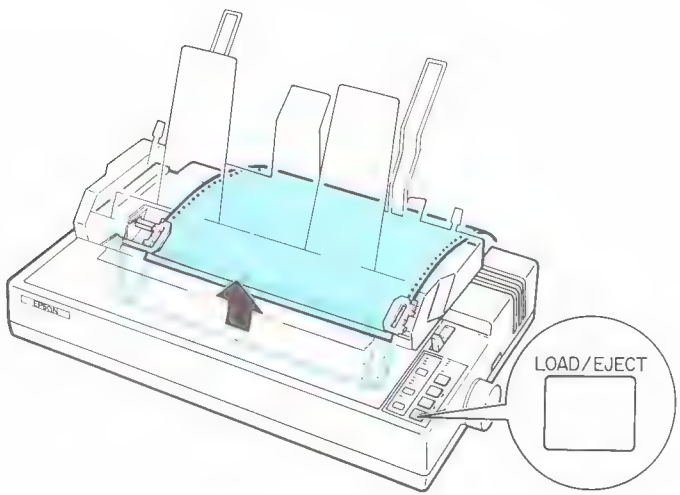
1. If a single sheet is still in the printer, eject it by pressing the LOAD/EJECT button. Then, pull the paper release lever forward to the continuous paper position.



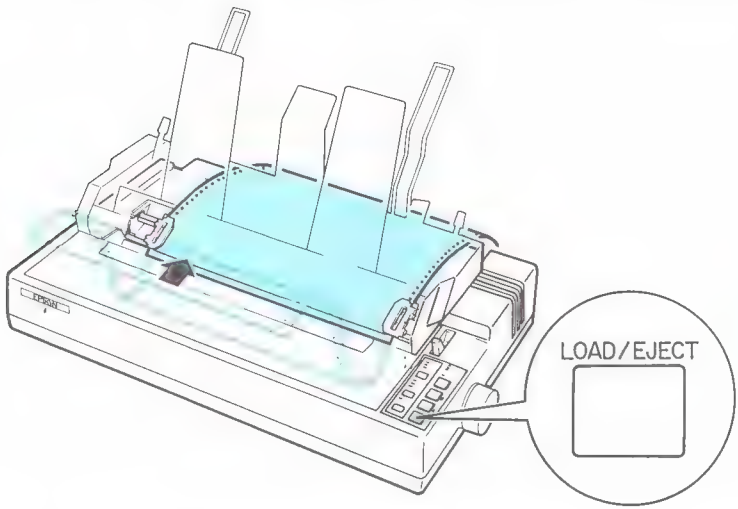
2. Raise the paper path guide. This guide directs the flow of continuous paper out of the front of the printer.



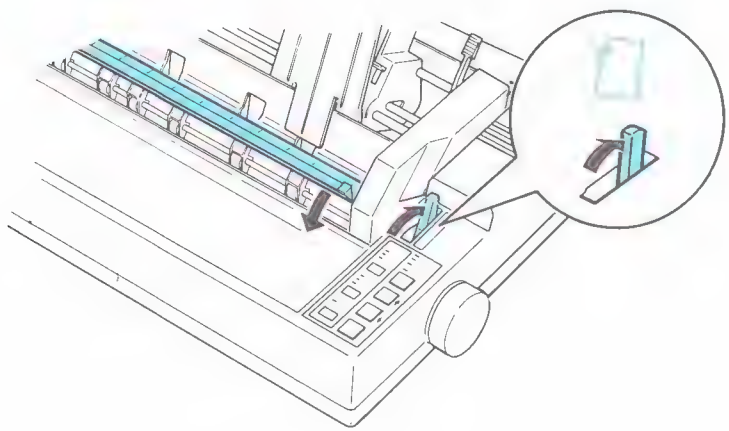
3. Load continuous paper by pressing the LOAD/EJECT button.



4. To switch back to cut sheet feeder operation, push the LOAD/EJECT button until the continuous paper feeds backward to the standby position.



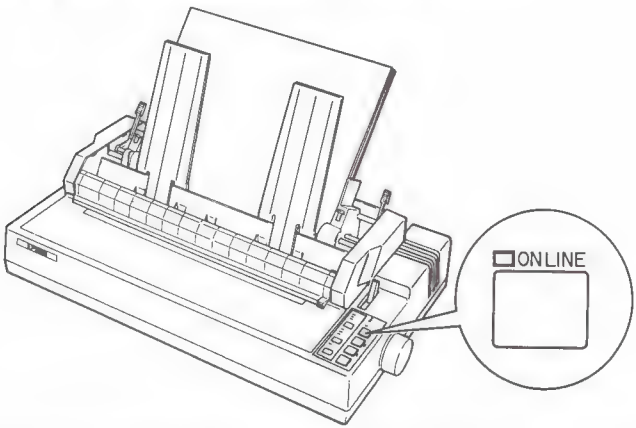
5. Close the paper path guide and push the paper release lever to the single sheet position.



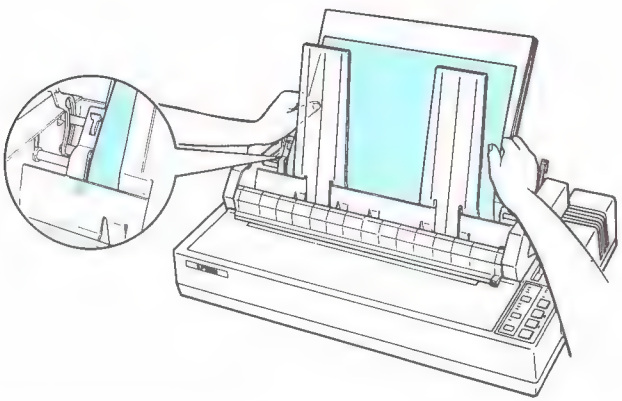
Single sheet insertion

Your cut sheet feeder also has a single sheet loading feature. This feature is especially useful because it allows you to switch to a different type or size of paper without replacing the supply of paper that is loaded in your cut sheet feeder.

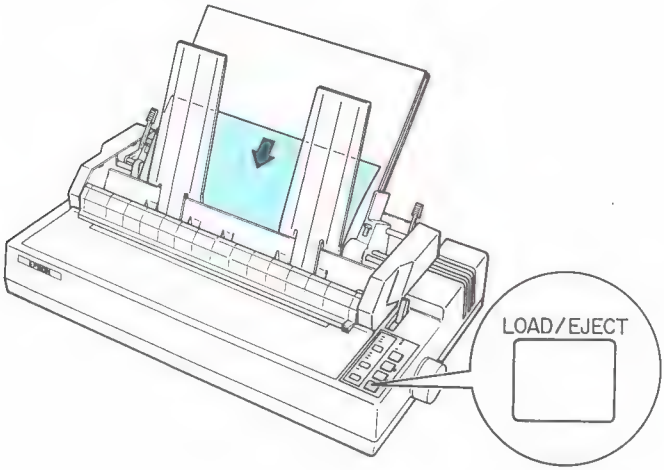
1. Press the ON LINE button to set the printer off line.



2. Align the single sheet to be fed with the marking on the left paper guide, then slide the sheet into the printer path until you feel resistance.



3. Press the LOAD/EJECT button to load the sheet.



If you want to use single sheet insertion for two or more consecutive pages, you will need to pull the paper set levers forward; otherwise, the next sheet will be loaded from paper stored in the cut sheet feeder bin.

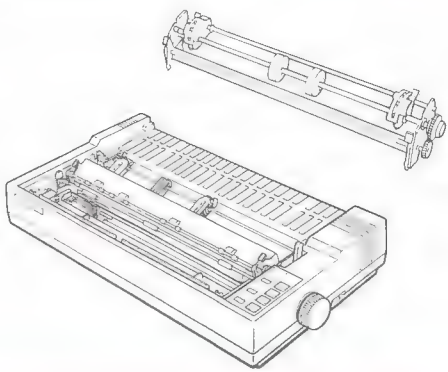
The Pull Tractor

The optional pull tractor #7311 (for the FX-850) or the #7312 (for the FX-1050) provides optimum continuous paper handling. The pull tractor is especially useful with continuous multi-part forms and labels. For best results, use the pull tractor along with the built-in push tractor as described in this section.

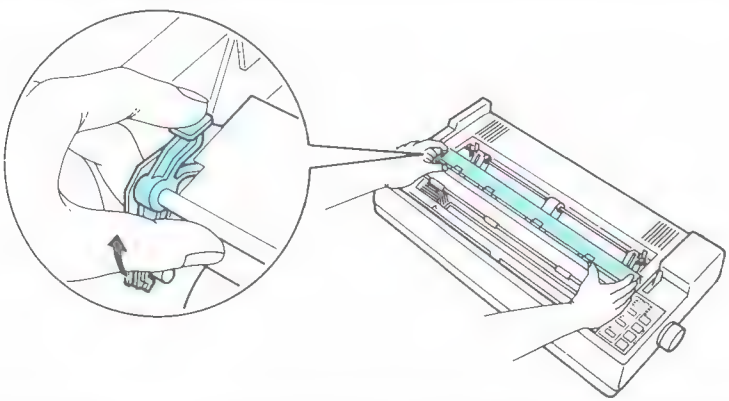
Installation

Before installing the pull tractor unit, make sure that:

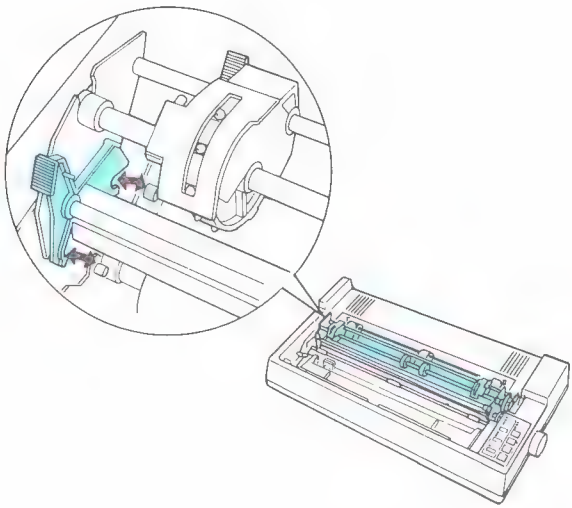
- The printer is turned off.
- The printer cover is removed.
- The paper guide is removed.



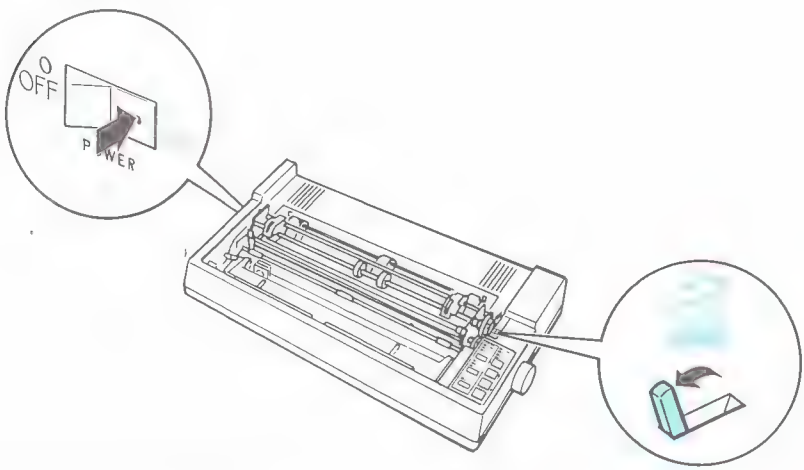
1. Remove the paper tension unit by pressing open the release levers and lifting up the front of the unit at the same time.



2. Fit the rear notches on the tractor over the rear mounting pins on the printer. Then, tilt the tractor unit toward you until the front latches click in place over the front mounting pins of the printer.



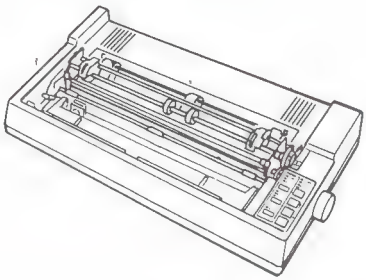
3. Pull the paper release lever to the continuous paper position and turn on the power.



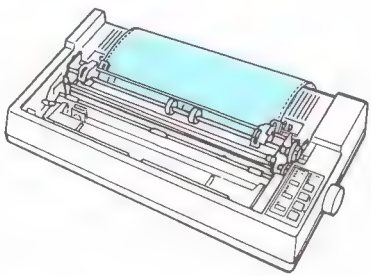
Paper handling

Before loading paper, make sure that:

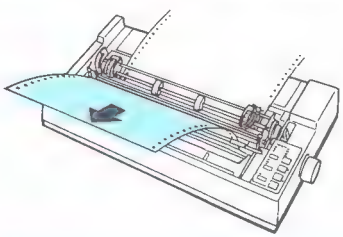
- The printer is turned on.
- The pull tractor unit is installed.
- The paper release lever is set to the continuous paper position.



1. Set the first four holes of the continuous paper onto the built-in push tractor as described in Chapter 2.

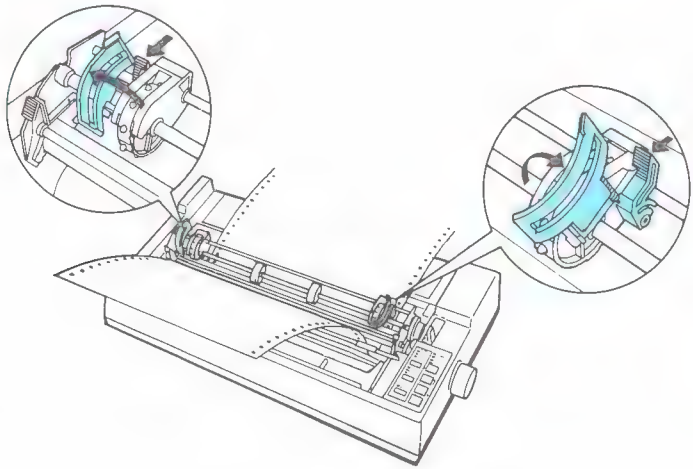


2. Press the LOAD/EJECT button to load the continuous paper, then press the FORM FEED button. This advances the paper one page so that you can fit the paper onto the pull tractor.

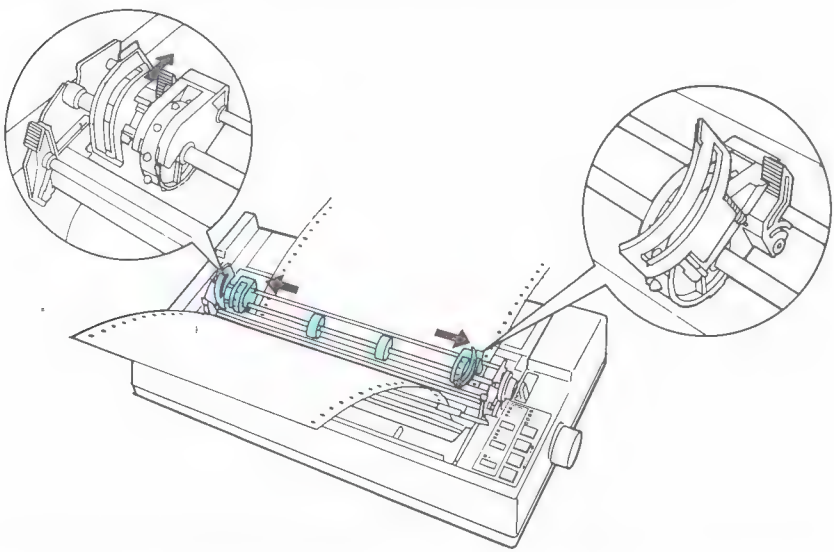


Never use the platen knob to feed the paper while the printer is turned on. If you need to adjust the loading position, be sure to use the micro adjustment function described in Chapter 3.

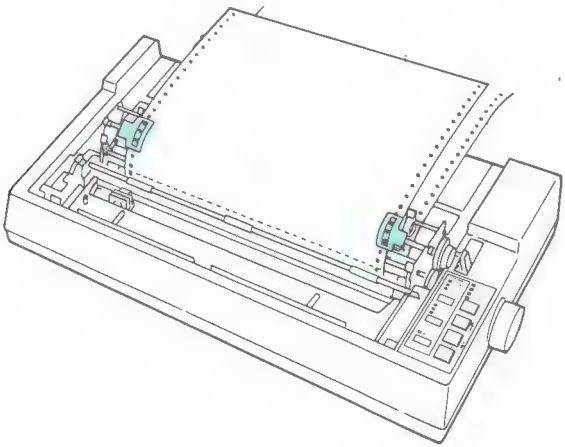
3. Open the sprocket covers of the pull tractor and release the sprocket lock levers.



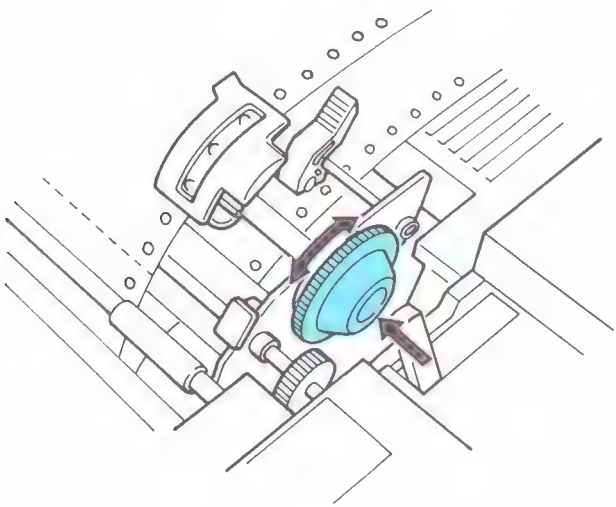
4. Adjust the sprocket frames to match the width of the paper, then adjust the paper supports so that they are evenly spaced between the sprocket units. (There is only one paper support on the #7311.)



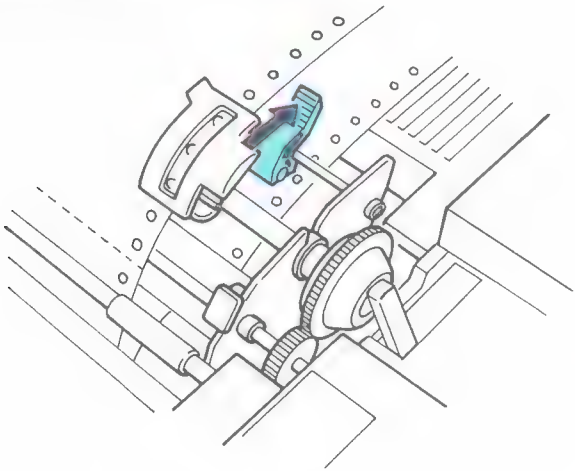
5. Fit the holes in the paper over the tractor pins on the sprocket frames and close the sprocket covers.



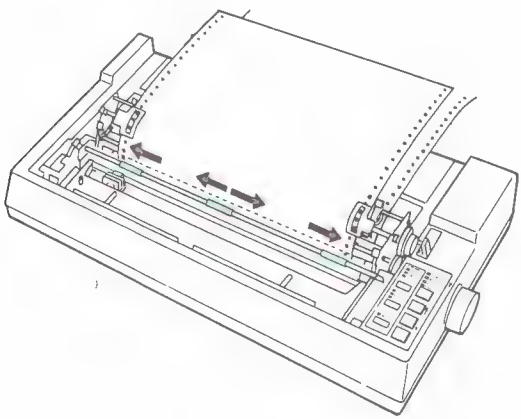
6. If the paper does not fit exactly onto the tractor pins, press in on the pull tractor feed knob and turn it in the desired direction.



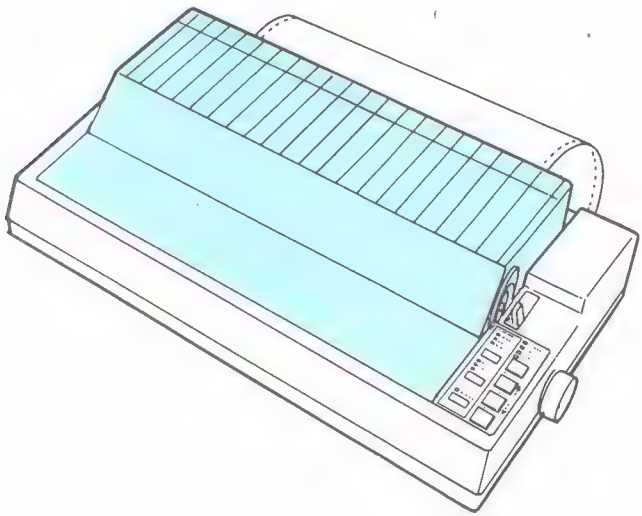
7. See that the paper is not crooked or wrinkled and lock the sprocket units in place.



8. Slide the rollers on the paper bail so they are evenly distributed across the width of your paper. Also, make sure that the right and left rollers are at the edges of the paper.



9. Install the paper guide; then, install the pull tractor cover as shown below and press the ON LINE button to set the printer on line.

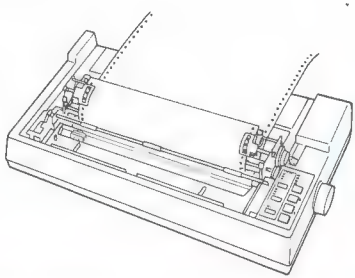


While the pull tractor can be used in combination with the built-in push tractor as described above, the pull tractor can also be used by itself. Instead of setting the paper on the pins of the push tractor, simply insert it through the same paper path as you would use with single sheet paper.

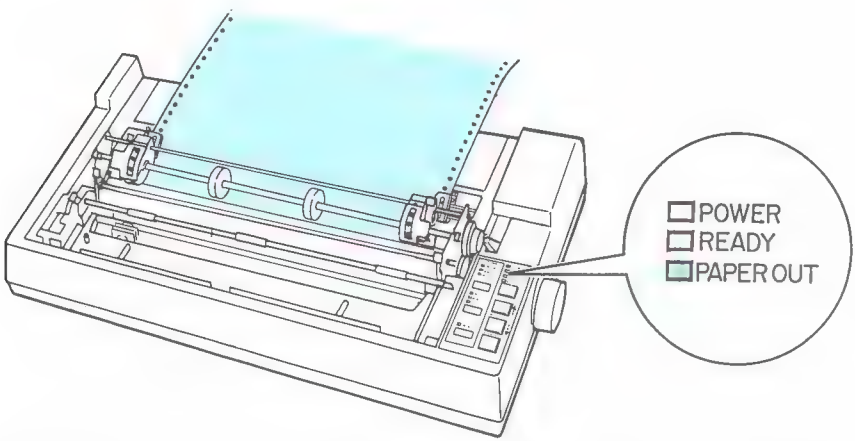
Removing the pull tractor

Before removing the pull tractor unit, make sure that:

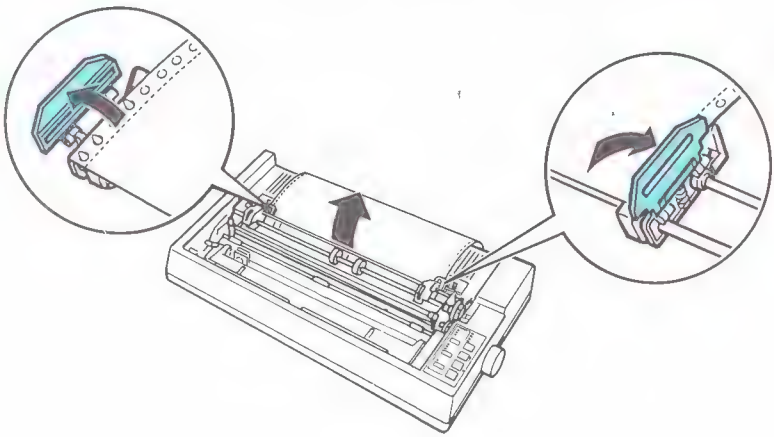
- The printer is turned on.
- The tractor cover is removed.
- The paper guide is removed.
- The printed document has been torn off.



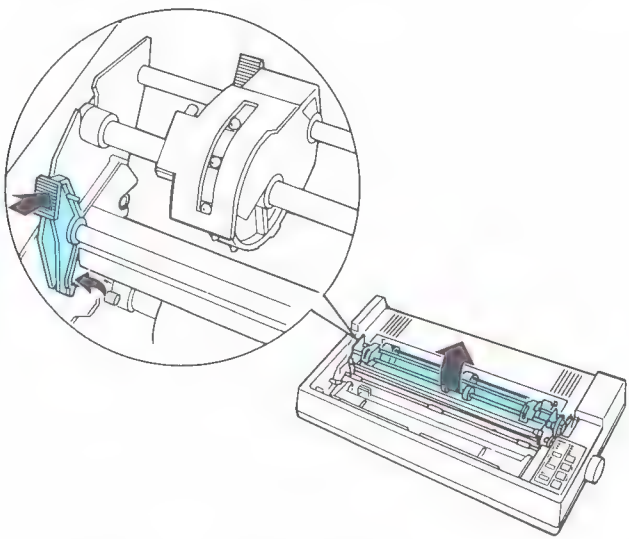
1. Press the ON LINE button to set the printer off line. Then, press the LOAD/EJECT button until the continuous paper feeds backward out of the paper path to the standby position. The PAPER OUT light comes on when the paper is completely out of the paper path.



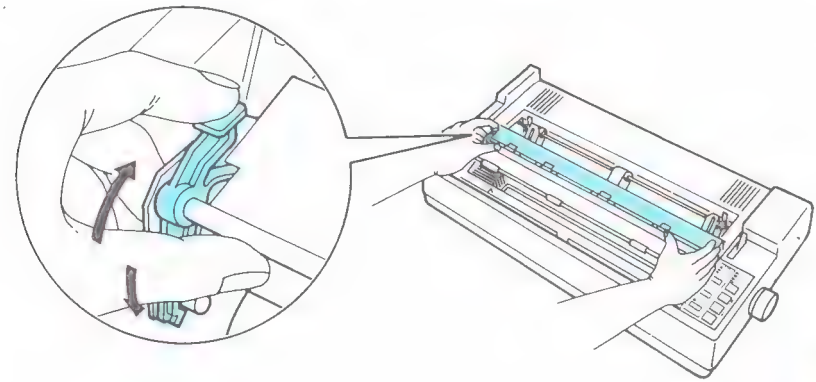
2. Remove the continuous paper from the push tractor unit.



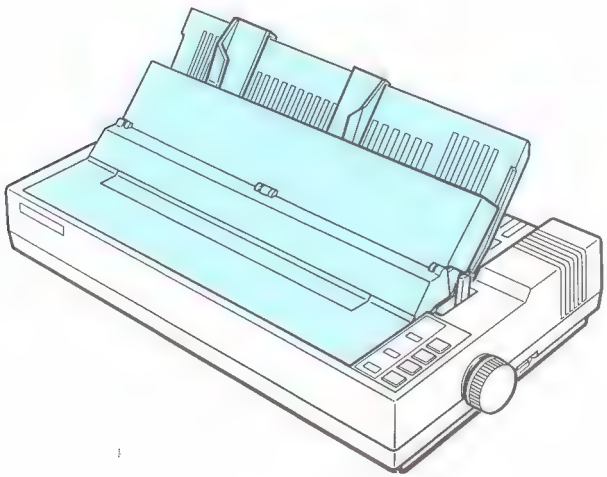
3. Press the tabs on the pull tractor unit and tilt it back and lift it off the printer.



4. Replace the paper tension unit as shown below.



5. Install the paper guide and printer cover.



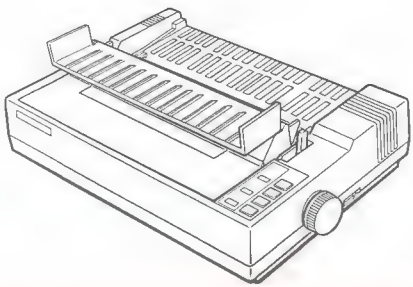
The Roll Paper Holder

The optional roll paper holder #8310 for the FX-850 allows you to use your printer with 8.5 inch roll paper like that used with telex machines. This provides an inexpensive alternative to continuous paper for applications requiring variable paper lengths.

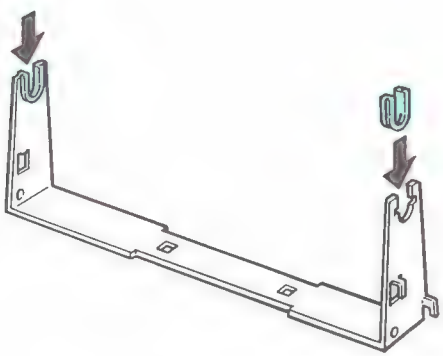
Installation

Before installing the roll paper holder, make sure that:

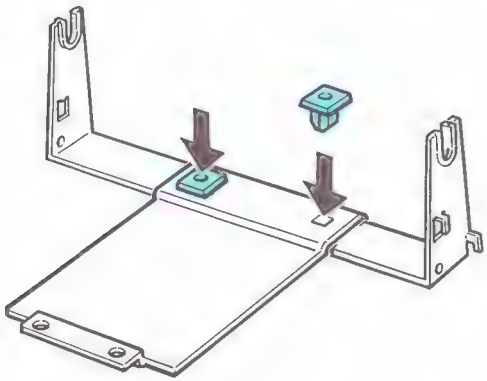
- The printer is turned off.
- The paper guide is removed.



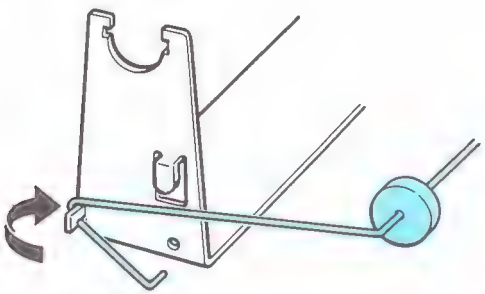
1. Fit the arc bearings into the stand as shown.



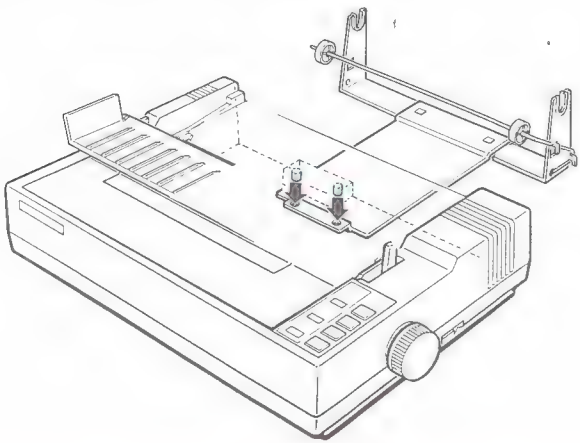
2. Place the base plate on onto the stand as shown and fasten the two together with the plastic spring clips. Make sure that you orient the stand and base plate as shown in the figure.



3. Attach the tension lever to the stand. Hook the tension lever onto both ends of the stand as shown at left below. Then, while pulling upward on the tension lever, fit the wire ends of the tension lever into the holes in the stand as shown at right.

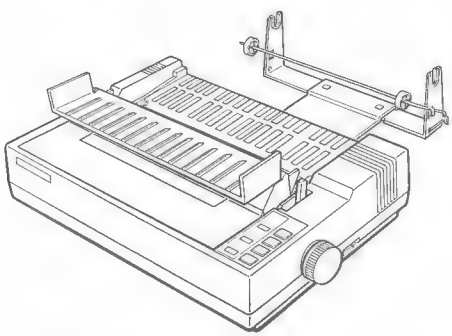


4. Position the roller paper holder underneath the printer as shown below. The holes in the base plate should fit onto the two corresponding positioning pegs on the bottom of the printer.



During use, the roll paper holder is held in place by the weight of the printer. The positioning pegs only serve to keep the holder from slipping out of position. If you pick up the printer, be careful to avoid dropping the roll paper holder.

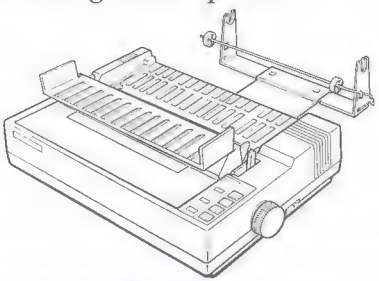
This completes installation of the roll paper holder.



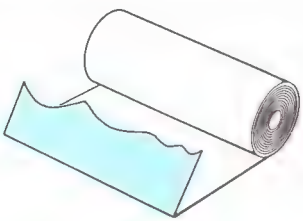
Paper handling

Before loading a roll of paper, check that:

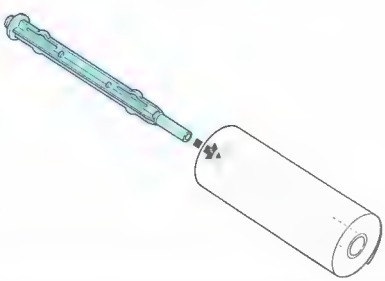
- The power is turned off.
- The roll paper holder is properly installed.
- The paper guide cover is open.
- The paper release lever is set to the single sheet position.



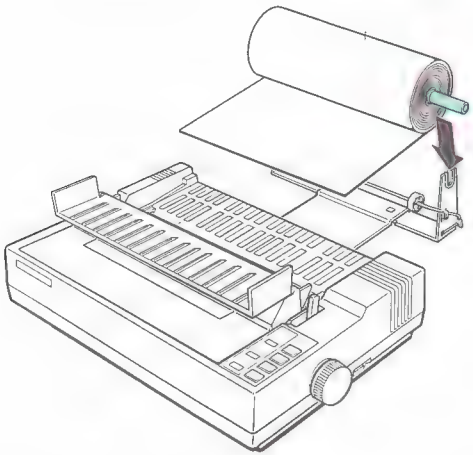
1. Cut the leading edge of the roll paper straight across.



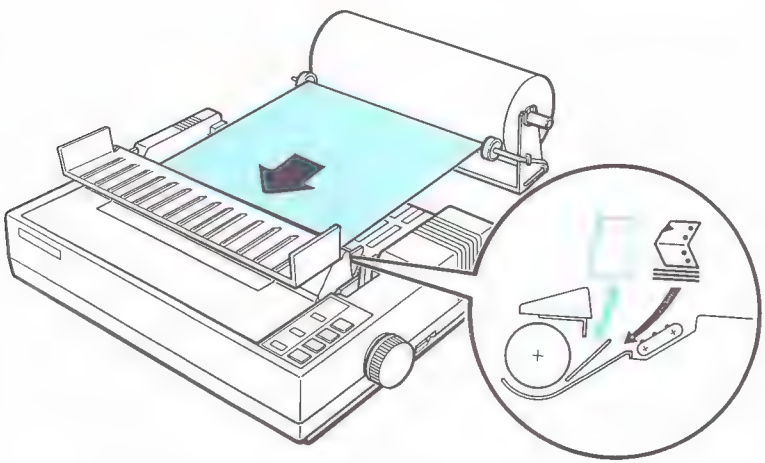
2. Insert the roll paper holder shaft into the center of the paper roll as shown.



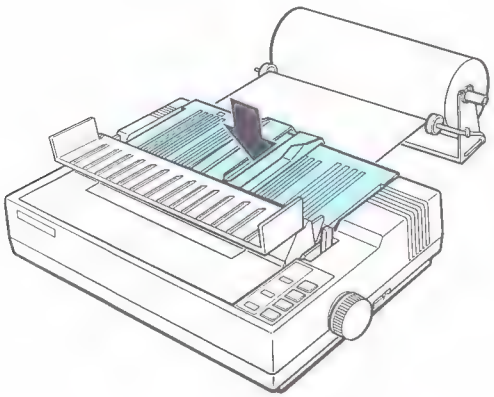
3. Set the shaft and paper roll onto the roll paper holder. The roll should be oriented so that paper feeds off of the bottom of the roll. Then, turn on the printer.



4. Bring the leading end of the paper up over the metal paper path guide and insert it into the printer. Then, press the LOAD/EJECT button to load paper.



5. Install the paper guide as a separator.



You are now ready to print. When you finish printing, set the printer off line, press the LINE FEED button to advance the paper by a suitable amount, then tear off the paper against the tear-off edge of the paper guide cover.

Roll paper cannot be fed backward by pressing the LOAD/EJECT button. When you want to unload roll paper, cut across the paper behind the point where it feeds into the printer, then use the LOAD/EJECT button to eject paper remaining in the printer.

The Interface Boards

A number of optional interfaces are available in case your computer is either not provided with a parallel interface or you wish or to increase the memory capacity of your printer's buffer.

Choosing an interface

Optional interfaces can be divided into three main categories which are described briefly below.

- IEEE-488 interfaces offer standardized connections, trouble-free operation, and the ability to connect computers, printers and other devices on the same line so that they may share data freely.

- The buffer parallel interfaces also offer trouble-free operation and standardized connections. They provide the printer with more memory to free the computer for other tasks when printing large amounts of text or graphics. Depending on the interface, you can increase the printer's data buffering capacity to either 32 Kbytes or 128 Kbytes (about 10 or 40 pages).

- Serial interfaces are required if your computer is not equipped with a parallel interface or if you need an interface that conforms to the Current Loop standard instead of RS-232C. These interfaces also provide some combination of the following features: X-on/X-off data communications protocol, loopback self-test modes, and data buffers that increase the printer's data buffering capacity to either 32 Kbytes or 128 Kbytes.

If you are unsure whether you need an optional interface or would like to know more about interfaces, contact your Epson dealer.

Compatible interfaces

The Epson interfaces that are compatible with FX-850 and FX-1050 are listed below.

Interface number	Name
#8143	RS-232C/current loop interface
#8148	Intelligent serial interface
#8165	Intelligent IEEE-488 interface

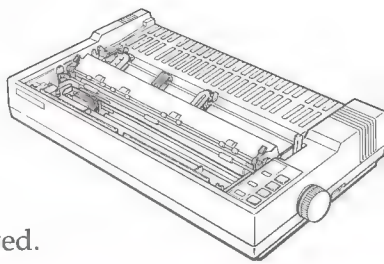
Please note that not all of these interfaces are available in all countries.

Removing the upper case

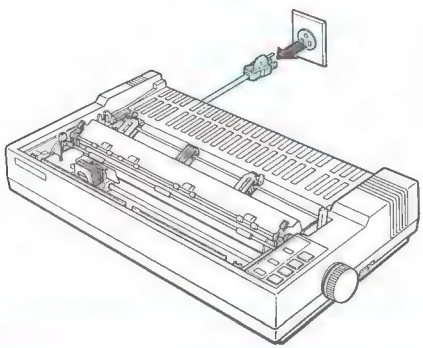
When you want to install an optional interface board, you must remove the upper case. This is easy to do, and the only tool needed is a cross-head screwdriver.

Before removing the upper case, make sure that:

- The printer and computer are both turned off.
- The parallel cable is disconnected from the printer and the computer.
- The printer cover is removed.
- The paper guide is removed.
- The ribbon cartridge is removed.
- Any installed printer option is removed.

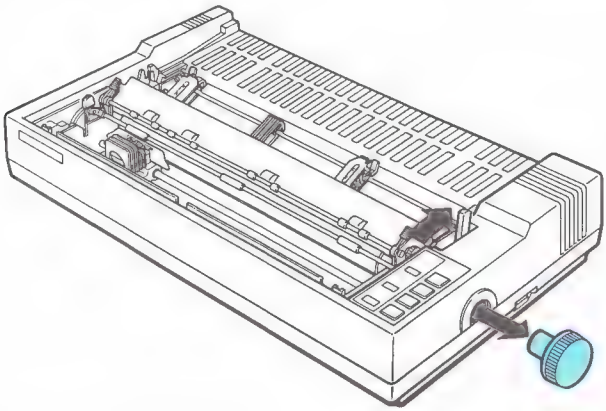


1. Unplug the power cable from the electrical outlet.

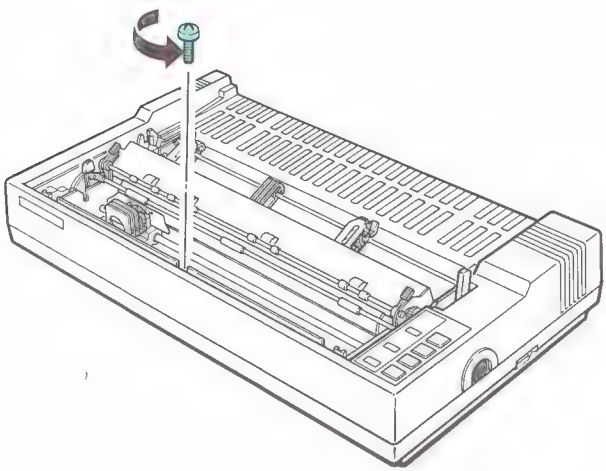


High voltage is present inside the printer when the power is on. Do not attempt to remove the upper case unless the printer is turned off and the power cord is unplugged. Also, do not touch contacts on the printer's circuit board because many of the components can be destroyed by the static electricity that may build up in your body.

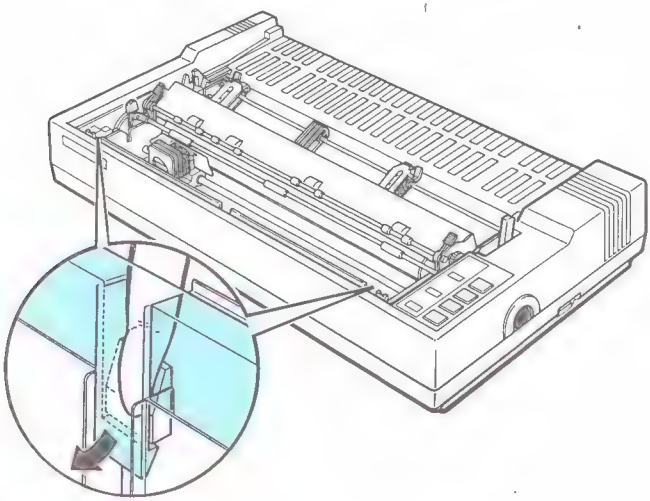
2. Remove the platen knob and push the paper release lever back to the single sheet position.



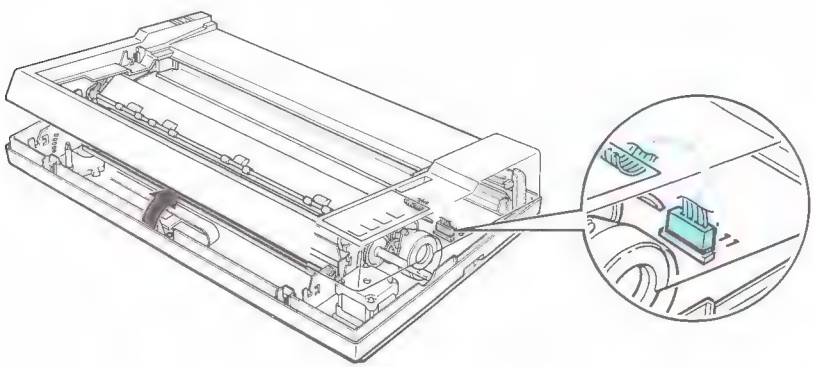
3. Remove the screw located inside the front center of the upper case.



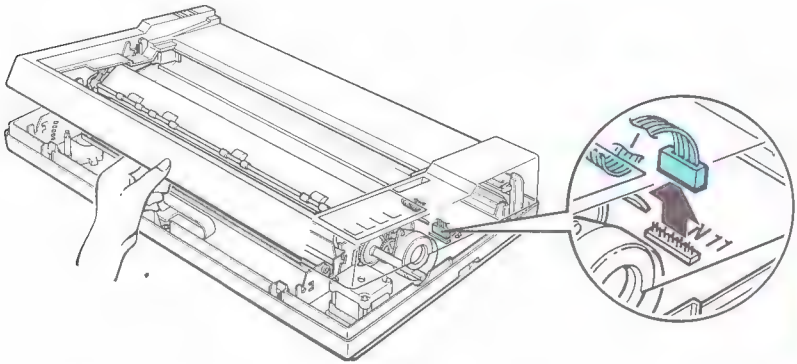
4. Reach inside the front cover and push in on the upper case fastening clips. These clips are located on both sides of the printer case. Push both clips at the same time where shown in the figure below.



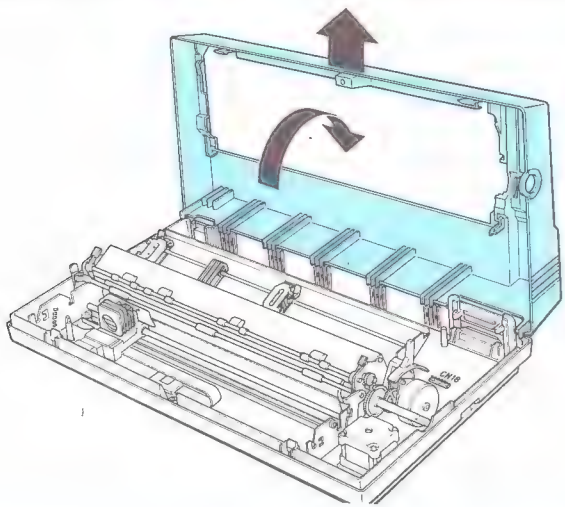
5. Raise the upper case slightly, taking care not to strain the flat cable attached to the control panel.



6. Carefully disconnect the control panel cable from the connector labelled CN11 on the main board.

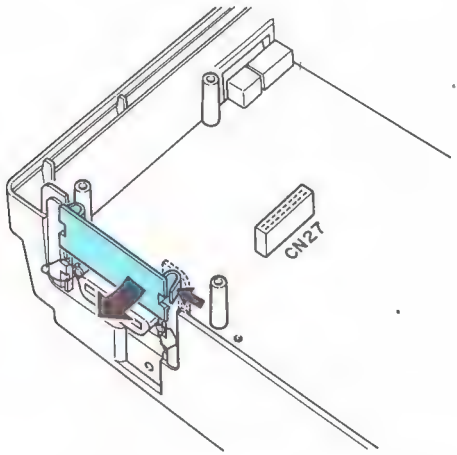


7. Tilt the upper case backward and lift it clear of the printer body.

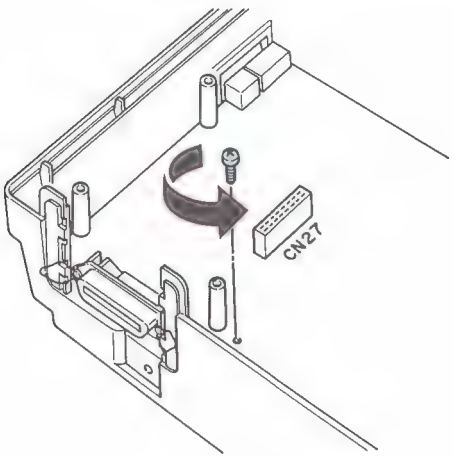


Use caution when removing or attaching the upper case to avoid damaging the printer.

8. Remove the option interface shield plate by pressing in on the plastic clips located at the back of the plate.

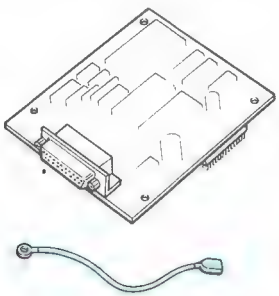


9. Using a cross-head screwdriver, remove the screw labelled CG from the main board.

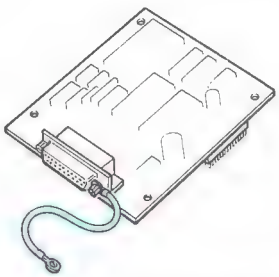


Installing the board

There are two basic interface board designs, which differ with respect to how the frame ground (FG) wire is attached. This slight difference changes the way the boards are installed in the printer, but does not affect the operation of the interface in any way. Check to see which type of interface board you have.



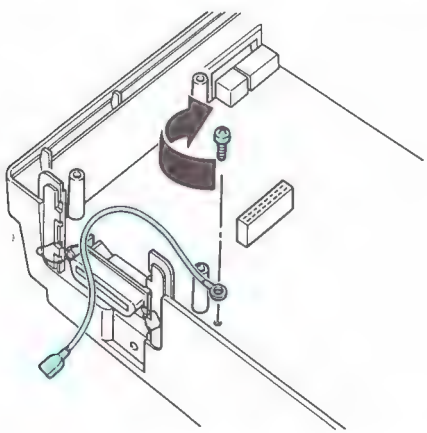
FG wire not attached
See below



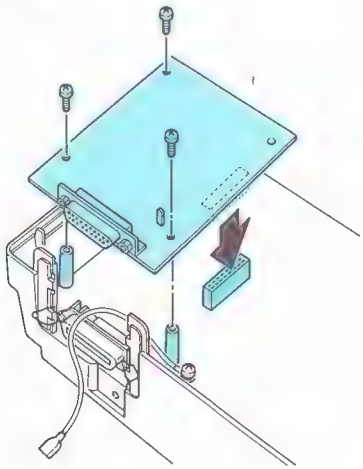
FG wire attached
Skip to page 5-39

FG wire not attached

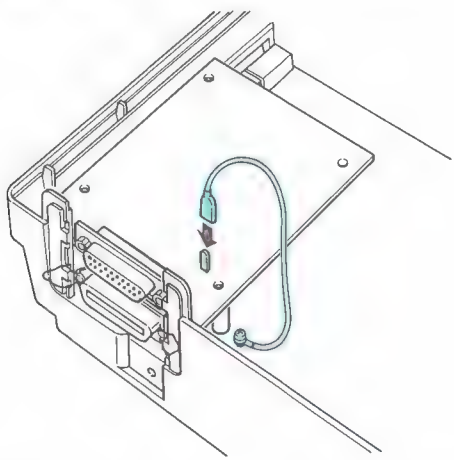
1. Use the CG screw to attach the round end of the FG (frame ground) wire to the main board and position the other end as shown.



2. Carefully insert the pins on the optional interface board into the mating connector on the main board; then secure the board with the three screws provided.



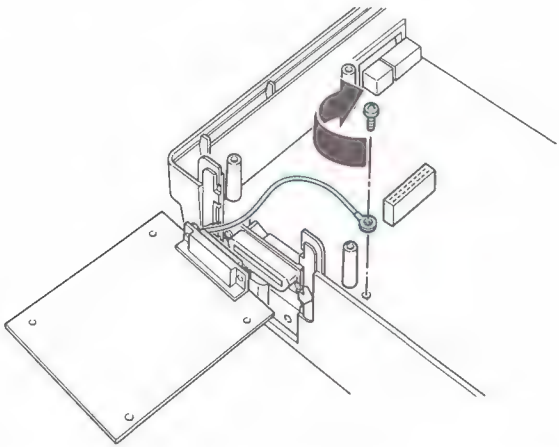
3. Attach the plug end of the FG wire onto the FG pin located on top of the interface board.



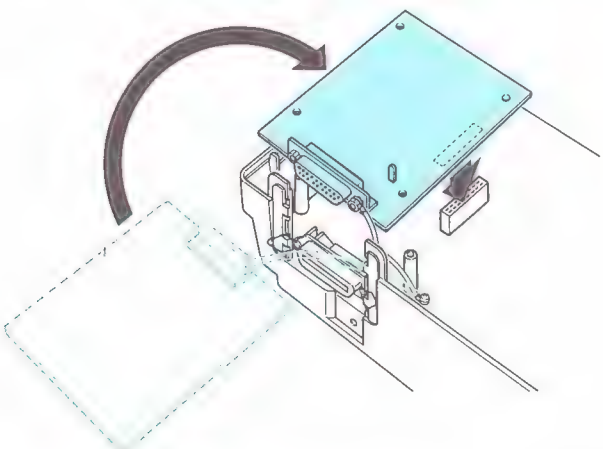
4. Set the DIP switches on the interface board according to the manual accompanying it.

FG wire attached

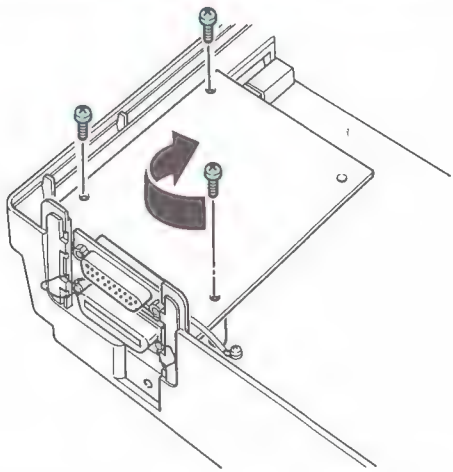
1. Carefully place the interface board next to the printer as shown below. Use the CG screw to connect the round end of the FG (frame ground) wire to the main board.



2. Holding the interface board level, rotate it clockwise into position and attach it to the main board. Make sure that the connector pins are properly inserted into the mating connector.



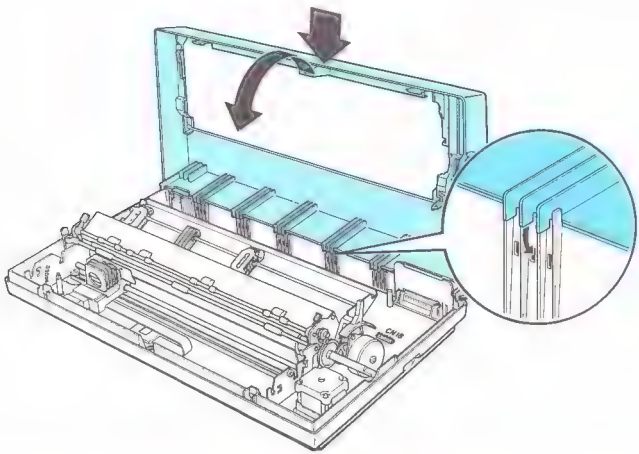
3. Secure the board with the three screws provided.



4. Set the DIP switches on the interface board according to the manual accompanying it.

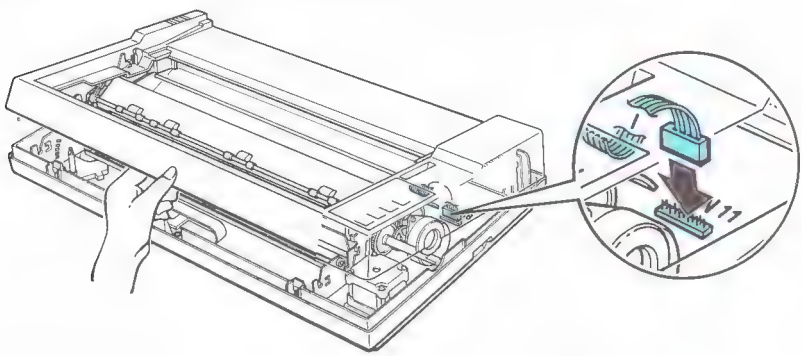
Attaching the upper case

1. Fit the hinges of the upper case into the openings in the lower case; then partially lower the upper case.

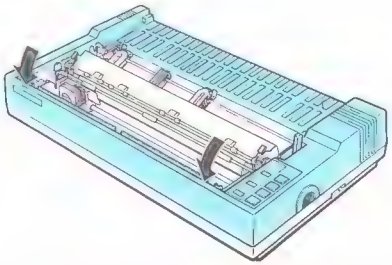


Take care not to pinch the FG wire between the upper and lower cases.

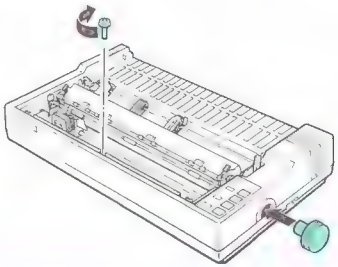
2. Carefully insert the control panel cable into the connector labelled CN11 on the main board.



3. Close the upper case. Make sure you press down on the front of the case until it locks into place.

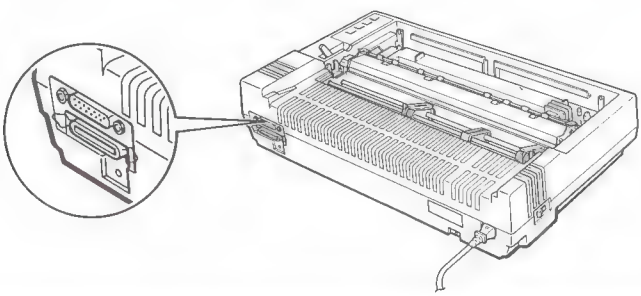


4. Insert and tighten the screw to secure the upper case, then reattach the platen knob.



When installing an optional interface board, be sure to disconnect the printer cable from the printer's built-in parallel interface. Two interface cables should not be installed at the same time.

This completes the installation of the optional interface board. Replace the ribbon cartridge, printer cover, and any other necessary parts or options.



Chapter 6 Maintenance

Cleaning the Printer 6-2

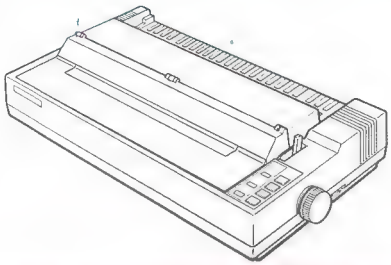
Replacing the Ribbon 6-4

Cleaning the Printer

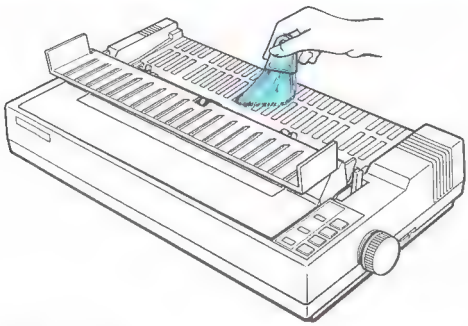
To keep your printer operating at its best, you should clean it thoroughly several times a year.

Before cleaning the printer, make sure that:

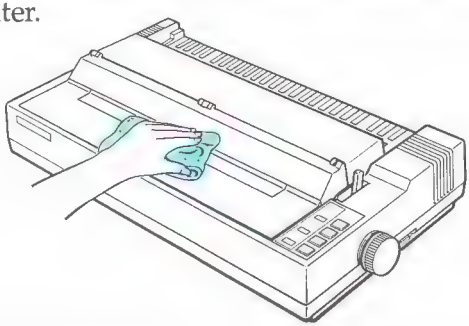
- The printer is turned off.
- The paper guide is removed.
- The cut sheet feeder, if installed, is removed.



1. Use a soft brush to carefully remove all dust and dirt.



2. If the outer case or paper guide is dirty or dusty, clean it with a soft, clean cloth dampened with mild detergent dissolved in water. Keep the printer cover in place to prevent water from getting inside the printer.



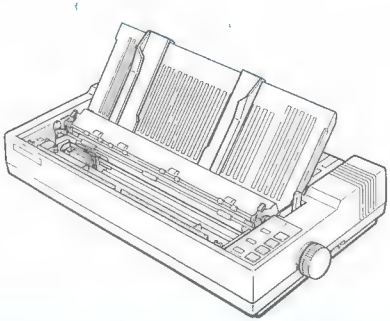
- Never use alcohols or thinners to clean the printer, since these chemicals can damage the components as well as the case.
- Be careful not to get water on the printer mechanism or electronic components.
- Do not use a hard or abrasive brush.
- Do not spray the inside of the printer with lubricants: unsuitable oils can damage the mechanism. Contact your Epson dealer if you think lubrication is needed.

Replacing the Ribbon

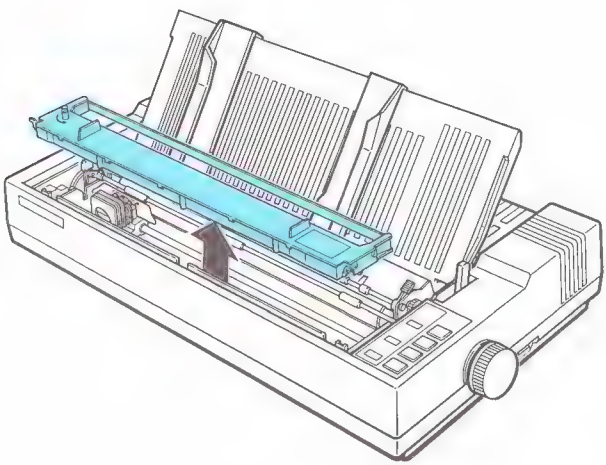
Replace the ribbon when the printout becomes too faint to read.Use only the #8750 ribbon cartridge for the FX-850 and #8755 for the FX-1050.

Before replacing the ribbon, make sure that:

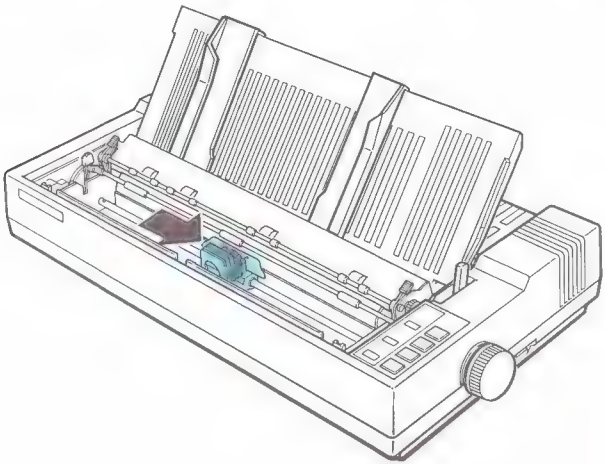
- The printer is turned off.
- The printer cover is removed.



1. To remove the ribbon cartridge, grip it by the black plastic tab(s), then lift the cartridge straight up and out of the printer.

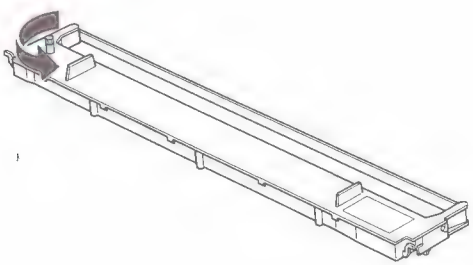


2. Slide the print head to the middle of the printer.

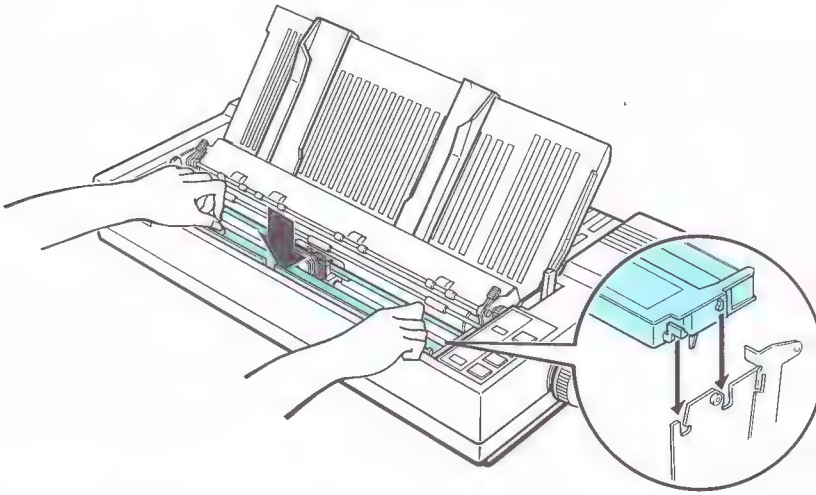


If the printer has been used recently, the print head may be hot. Let it cool before attempting to replace the ribbon.

3. To remove excess slack in the new ribbon, turn the ribbon-tightening knob.

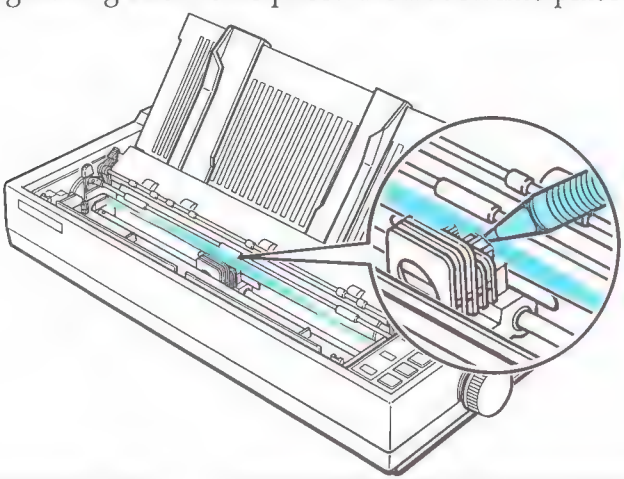


4. Push the new ribbon cartridge firmly into position, making sure the plastic hooks fit into the printer.

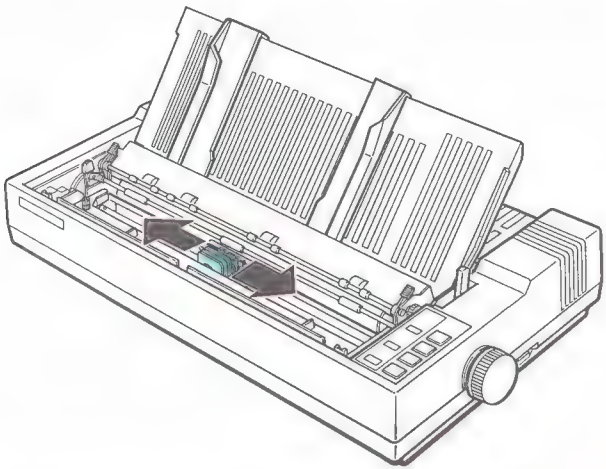


Press lightly on both sides of the cartridge to make sure the hooks are properly inserted.

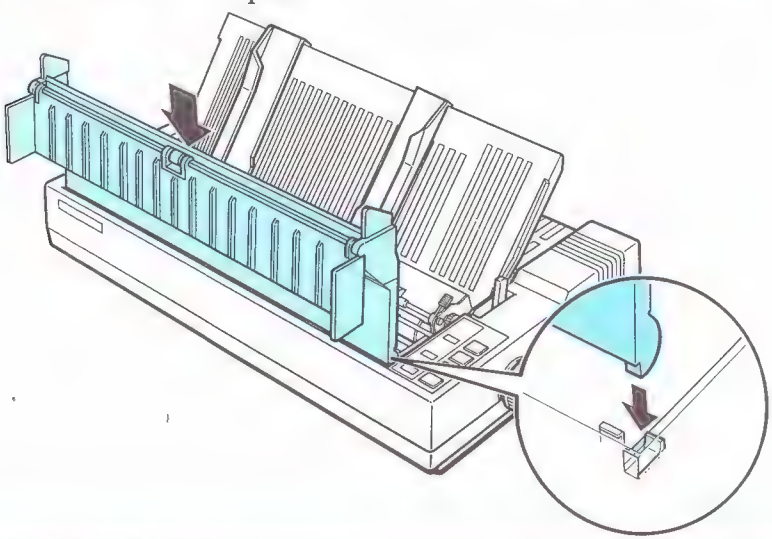
5. Use a pointed object, such as a pencil, to guide the ribbon between the print head and ribbon guide while you turn the ribbon-tightening knob to help feed the ribbon into place.



6. Slide the print head from side to side to make sure that it moves smoothly. Also check that the ribbon is neither twisted nor creased.



7. Insert the legs of the printer cover into the printer, then tilt the printer cover back into place.



Replacement of the ribbon cartridge is now completed.

Chapter 7 Troubleshooting

Troubleshooting 7-2

Troubleshooting

This chapter lists problems you might encounter while operating your printer and likely solutions to these problems. If you have difficulty achieving some desired printing result, locate the problem in the table below and refer to the appropriate page for the solution.

Power supply

- Power is not being supplied to the printer. Refer to 7-4

Printing

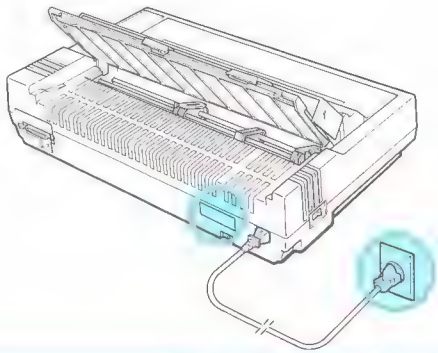
- The printer does not print or stops printing. Refer to 7-5
- The print is faint or uneven. Refer to 7-7
- Dots are missing in printed characters or graphics. Refer to 7-8
- While using application software
  Fonts or characters set by software cannot be printed. Refer to 7-9
  Characters selected by SelecType cannot be printed. Refer to 7-11
- While running a program, the printout is not what you expect. Refer to 7-12

Paper feeding

- Without use of the cut sheet feeder
  Single sheets do not feed properly. Refer to 7-13
- Using the tractor unit
  Continuous paper does not feed properly. Refer to 7-15
- Using the cut sheet feeder
  The cut sheet feeder either does not operate or does not load paper properly. Refer to 7-18
  Paper does not feed properly. Refer to 7-19

- Switching between single sheets and continuous paper can not be performed properly. Refer to 7-20
- The short tear-off function does not operate properly. Refer to 7-21
- Text is printed on the same line or with extra blank lines in between. Refer to 7-22
- Page length and margin settings do not work as expected. Refer to 7-23

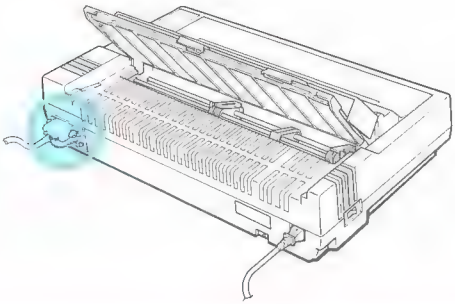
Power is not being supplied to the printer. (The POWER light does not go on.)

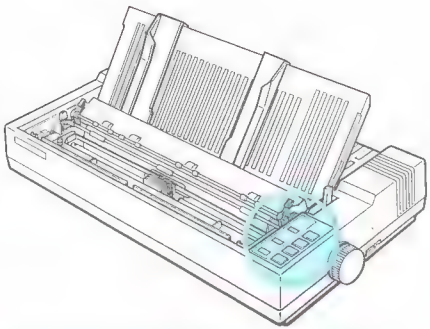


Check Point	Possible Solution
Is the power cable properly plugged into the electrical outlet?	Turn off the printer, plug the power cable securely into the electrical outlet, then turn the printer back on. Refer to 1-17.
Is power being supplied to the electrical outlet?	If the electrical outlet is controlled by a switch, locate an electrical outlet that is not controlled by an outside switch.
Is the voltage correct for your printer?	Check the label on the printer's rear panel and confirm that the printer's voltage rating matches the voltage of your electrical outlet. If the voltages do not match, contact your Epson Dealer immediately. DO NOT connect the power cable to an electrical outlet. Refer to 1-16.

If the POWER light still does not go on, the problem may lie with the electrical outlet. Plug another electrical device into the outlet to determine whether the outlet is operating properly.

The printer does not print or stops printing.

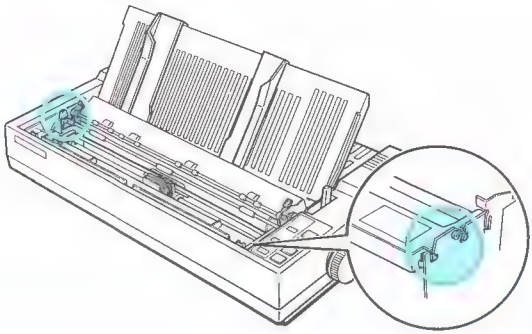




Check Point	Possible Solution
Is the interface cable plugged in securely? Check both ends of the cable between the printer and the computer.	Secure the connector using the wire retaining clips. Make sure your interface cable meets the specifications for the printer and computer. Refer to 1-27.
Is the ON LINE light on?	Check the on-line status on the printer's control panel. If the printer is not on line, press the ON LINE button once. The ON LINE light should go on. Refer to 3-3.
Is the PAPER OUT light on?	Load more paper into the printer. Refer to 2-2, 2-7.
Is the paper caught on something in the area of the print head?	Turn off the printer, remove the sheet of paper that is caught, then load new paper and resume printing. Make sure that the leading edge of the paper is straight and smooth to avoid paper jamming. Refer to 1-24.

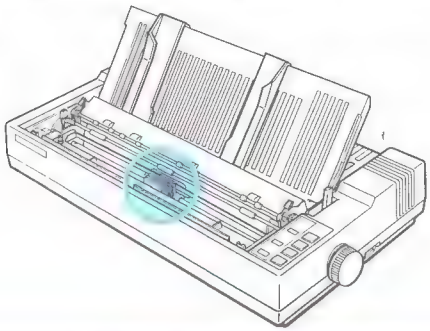
Check Point	Possible Solution
Is the ribbon caught on something in the area of the print head?	Turn off the printer, re-install the ribbon properly and take up any slack. Since this problem is usually caused by a worn ribbon, it is best to replace the ribbon cartridge. Refer to 6-4.
Did the buzzer sound several times?	This indicates an error in printer operation. Turn off the printer, check for paper jams or other problems, then turn the printer back on. If the printer still does not print correctly, contact your Epson dealer. Refer to 1-24.
Is DIP switch 1-1 set to on?	The user-defined character set is selected. If no characters have been defined all characters sent to the printer print as spaces. Set DIP switch 1-1 to off.
Is the software properly installed for your printer?	Use the program's setup (or install) procedure to check the printer settings on your computer's display, then reset the values as needed.
Can the printer execute the self test?	Disconnect the interface cable from the computer, then run the self test. If the self test does not print properly, contact your Epson dealer. Refer to 1-18.

The print is faint or uneven.



Check Point	Possible Solution
Are the hooks on both sides of the ribbon cartridge inserted securely into the printer?	Remove the ribbon cartridge and reinstall it; make sure the cartridge hooks are inserted securely into the printer. Refer to 1-10.
Is the ribbon worn out?	A worn ribbon can damage the print head and should be replaced. Install a new ribbon cartridge as soon as possible. Refer to 6-4.
Is the paper thickness lever correctly set for the paper you are using?	Set the paper thickness lever to match the thickness of your paper. Refer to 2-20.

Dots are missing in the printed characters or graphics.



Check Point	Possible Solution
Is a line of dots missing in the printed result?	The print head is damaged. Stop printing and contact your Epson dealer to have the head replaced.
Are dots missing at random in the printed result?	The ribbon has excessive slack which has caused it to come loose or get caught on something. Stop printing, turn off the printer, and reinstall the ribbon cartridge. Refer to 1-10.

The typestyle or characters that are set by the software cannot be printed(while using application software).

Check Point or Phenomenon	Possible Solution
Is the software properly installed for your printer?	Use the program's setup (or install) procedure to check the printer settings on your computer's display, then reset the values as needed.
Is the Roman, Sans Serif or Draft font selected in your software, but the characters are printed in a different font?	If your application program will accept control codes, set the codes to the values below to select the built-in fonts: Roman: ESC k 0 Sans Serif: ESC k 1 Draft: ESC x 0 If control codes cannot be used, use SelecType. Refer to 3-4, 3-21.
Are italic characters printed instead of the selected graphic "line" characters?	If your application program allows you to perform settings using control codes, specify the Epson Extended Graphics character table using ESC t 1. If control codes cannot be used, set DIP switch 1-3 to on. Refer to 3-26.

Check Point or Phenomenon	Possible Solution
Are graphic characters lines, etc. being printed instead of the selected italic characters?	If your application program allows you to perform settings using control codes, specify the italic character table using ESC t 0. If control codes cannot be used, set DIP switch 1-3 to off. Refer to 3-26.
Are characters not belonging to the selected international character set being printed?	If your application program allows you to perform settings using control codes, specify the desired international character set using ESC R *n*. If control codes cannot be used, select the desired set by setting the DIP switches 1-6, 1-7, and 1-8. Refer to 3-24.

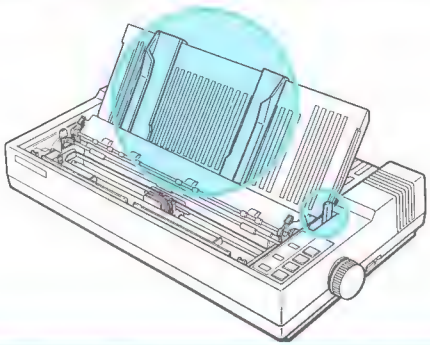
The characters selected by SelecType cannot be printed(while using application software).

Check Point	Possible Solution
Is the software properly installed for your printer?	Use the program's setup (or install) procedure to check the printer settings on your computer's display, then reset the values as needed.
Has your software changed the settings selected by SelecType?	If your application program allows you to change the printing style, software control will override the SelecType settings. Make sure that the printing commands used in the software are correct, then try printing again.

The printout is not what you expect (while running a program).

Check Point	Possible Solution
Use the data dump mode to check the data being sent from the computer. In the data dump mode, data is printed in hexadecimal notation and is in ASCII format.	Refer to the Command Summary to make sure that all the printer commands used in the program are correct. Some computers may have special printer commands. Check your computer's programming manual. Example:WIDTH "LPT1:", 255. Refer to 3-28.
Characters cannot be defined using ESC & and ESC :.	When defining characters, make sure that DIP switch 1-1 is set to OFF.

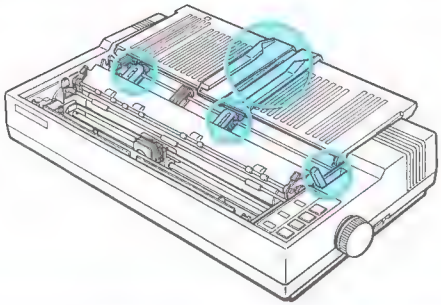
Single sheets do not feed properly (without use of the cut sheet feeder).



Check Point	Possible Solution
Is the paper release lever pulled forward to the continuous paper position?	Push paper release lever back to the single sheet position. Refer to 2-3.
Is the paper guide removed from the printer, or is the paper guide in the horizontal position?	When printing on single sheets, use the paper guide in its upright position. Refer to 2-2.
Are the left and right edge guides placed too close together, thus preventing the paper from feeding smoothly?	Adjust the position of the edge guides so that the paper can move up and down freely. Refer to 2-4.
Is the Cut Sheet Feeder mode turned on? (Is DIP switch 2-2 on?)	When the cut sheet feeder is not in use, DIP switch 2-2 should always be off. Refer to 3-7.

Check Point	Possible Solution
Are you trying to feed paper using one of the control panel buttons while the printer is on line (ON LINE light is on)?	Press the ON LINE button once to set the printer off line; then feed the paper. After feeding the paper, press the ON LINE button again to set the printer on line. Refer to 3-3.
Do the dimensions of the paper exceed specified limitations?	Be sure to use only paper sizes that are within the specified range. Multi-part forms cannot be used with this printer's single-sheet feeding system. Refer to 9-3.

Continuous paper does not feed properly (using the tractor).

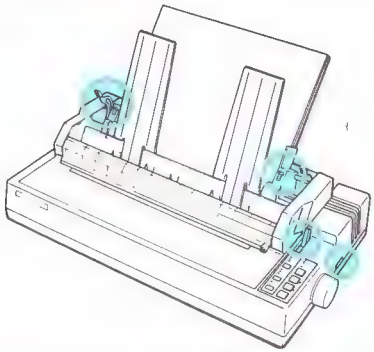


Check Point	Possible Solution
Is the paper release lever pushed back to the single sheet position?	When using the tractor, be sure the paper release lever is pulled forward to the continuous paper position. Refer to 2-7.
Is the paper guide in the upright position?	When using continuous paper, make sure that the paper guide is in the lowered position so that it can act as a paper separator. Refer to 2-12.
Is the paper caught on the edge guides?	When using continuous paper, make sure that the paper guide is installed over the paper and that the edge guides are positioned at the center of the paper's width. Refer to 2-12.
Is the continuous paper in the paper path? (In this case, the paper would have to feed backward to the standby position.)	Press the LOAD/EJECT button again to load the paper.

Check Point	Possible Solution
Are the holes on the sides of the paper misaligned with respect to each other. (Is the paper improperly set on the tractor?)	Reposition the paper on the tractor pins if necessary.Refer to 2-10.
Are the sprocket frames incorrectly positioned for the paper width?	Position the right sprocket frame to remove any slack across the width of the paper. Refer to 2-11.
Are the sprocket lock levers unlocked? Are the sprocket covers open?	Position the sprocket frames to match the width of your paper; then lock them in place by pressing the sprocket lock levers away from you. Refer to 2-11.
Is some object on top of the paper supply or is a cable or other object obstructing smooth paper feeding?	Make sure that the paper can feed smoothly into the printer. Refer to 2-6.
Is your supply of continuous paper positioned too far from the printer?	Position your paper supply within 1 meter of the printer. Refer to 2-6.
Does the position of your paper supply prevent it from feeding straight into the printer?	Position the stacks of incoming new paper and outgoing printed paper so the paper feeds straight into and out of the printer.Refer to 2-6.
Are you trying to feed paper using one of the control panel buttons while the printer is on line (ON LINE light on)?	Press the ON LINE button once to set the printer off line, then try feeding paper. After feeding paper, press the ON LINE button again to set the printer on line. Refer to 3-3.

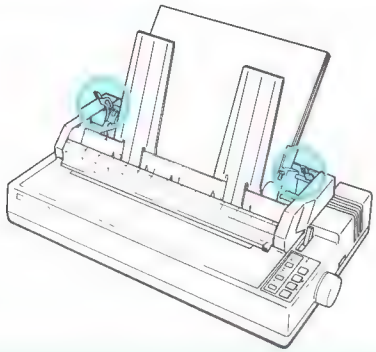
Check Point	Possible Solution
Do the dimensions of the paper exceed specified limitations?	Be sure to use only paper sizes that are within the specified range. Your printer can print on continuous multipart forms consisting of 1 original and 3 copies. Refer to 9-3.
If you are using the optional pull tractor together with the built-in push tractor, are the sprockets aligned differently on the two tractor units?	When using both tractors, be sure that the sprockets on both are positioned even with other.

The cut sheet feeder either does not operate or does not load paper properly.



Check Point	Possible Solution
Is DIP switch 2-2 set to off?	DIP switch 2-2 must be set to on in order to use the cut sheet feeder. Refer to 5-4.
Is the paper release lever set to the continuous paper position?	Push the lever back to the single sheet position. Refer to 5-2.
Are the paper set levers pulled forward?	After loading a stack of paper in the cut sheet feeder, be sure to push the paper set levers backward. Refer to 5-7.
Is the cut sheet feeder incorrectly installed on the printer?	Make sure that the cut sheet feeder's mounting notches are properly mated with the pins on the printer. Refer to 5-3.
Is paper caught in the area of the print head?	Remove the paper jam (temporarily remove the cut sheet feeder if necessary).

Paper does not feed properly (using the cut sheet feeder).



Check Point	Possible Solution
Are the left and right paper guides placed too close together, thus preventing smooth paper feeding?	Adjust the position of the paper guides so that the paper can move up and down freely. Refer to 5-7.
Have you loaded too many sheets of paper in the cut sheet feeder's hopper?	The hopper can hold a maximum of 150 sheets.
Is there too much paper in the stacker?	Empty the stacker. Never let more than 150 sheets of paper accumulate in the stacker.
Was the stack of paper adequately fanned before loading into the hopper?	Before loading the paper, be sure to fan it sufficiently and align the edges of the stack. Refer to 5-6.
Are you using a paper weight that is too heavy or too light?	Refer to the specifications on page 9-4 and make sure that your paper is of the proper size and quality.
Is the paper worn out or creased?	Set new, clean sheets of paper.

Switching between single sheets and continuous paper can not be performed properly.

Check Point	Possible Solution
Is the paper release lever set to the proper position?	When using single sheet paper, push the lever back to the single sheet position. When using continuous paper, pull the lever forward to the continuous paper position.
Did continuous paper feed backward far enough to reach the standby position before you changed the position of the paper release lever?	Always make sure that the PAPER OUT light comes on (that paper is completely out of the paper path) before changing the position of the paper release lever.

The short tear-off function does not operate properly.

Check Point	Possible Solution
Is DIP switch 1-5 set to on?	Set DIP switch 1-5 to off to turn on the short tear-off mode.
Did printing end in the middle of a page?	Finish the page by sending a form feed code (FF) to the printer or by sending enough line feed codes (LF) to advance the remainder of the page.

Text is printed on the same line or with an extra blank line in between.

Check Point	Possible Solution
Is all the text printed on the same line?	This happens if no line feed signal is sent at the end of each line of text. Check the auto line feed setting of DIP switch 2-4, and set it to on. Refer to 3-9.
Is text printed with an extra blank line in between?	Two line feed signals are being sent. Check the auto line feed setting of DIP switch 2-4, and set it to off. Refer to 3-9.
Is text printed with an extra blank line in between, even after setting DIP switch 2-4 to off?	Disable the $\overline{\text{AUTO FEED XT}}$ signal of your interface.

Page length and margin settings do not work as expected.

Check Point or Phenomenon	Possible Solution
The point at which printing starts is too high or too low on the page.	Use micro adjustment to adjust the loading position. Refer to 3-14. If the problem persists, check and adjust the top margin set by your application software.
The page length does not match the length of the paper.	Change the page length setting with DIP switch 2-1 or, if you can send control codes to the printer, by sending the ESC C or ESC C 0 sequence. If this does not resolve the problem, check and adjust the page length set by your application software. If you are using the cut sheet feeder, the self test function prints the number of printer lines that will fit on a single sheet. Use this feature to determine the correct page length setting. Refer to 3-10.
Skip over perforation does not work as expected when using continuous paper.	Set the correct page length. To ensure that the perforation is located exactly in the middle of the region skipped,adjust the loading position to the point that is one half the skip size height from the leading edge of the paper.

Chapter 8 Transporting the Printer

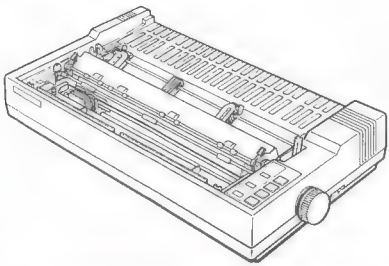
Transporting the Printer 8-2

Transporting the Printer

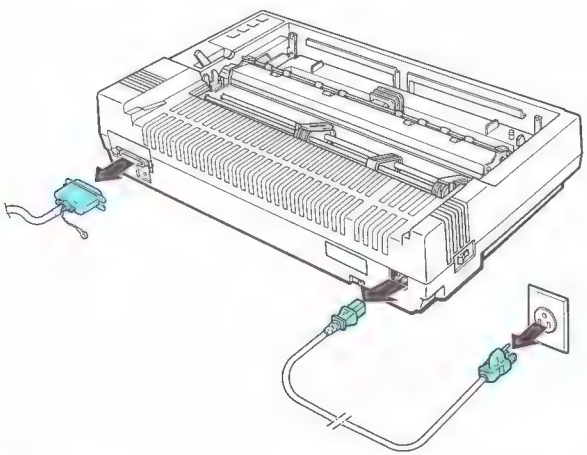
If you need to transport your printer some distance, carefully repack the printer using the original box and packing materials.

Before repacking the printer, make sure that:

- The printer is turned off.
- Any installed options are removed.
- The paper guide is removed.
- The printer cover is removed.

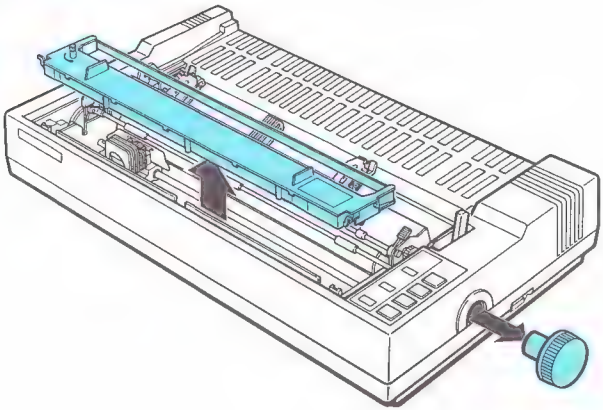


1. Unplug the power cable from the electrical outlet and from the back of the printer. Fold up the cable and tie it, then disconnect the interface cable from the printer.

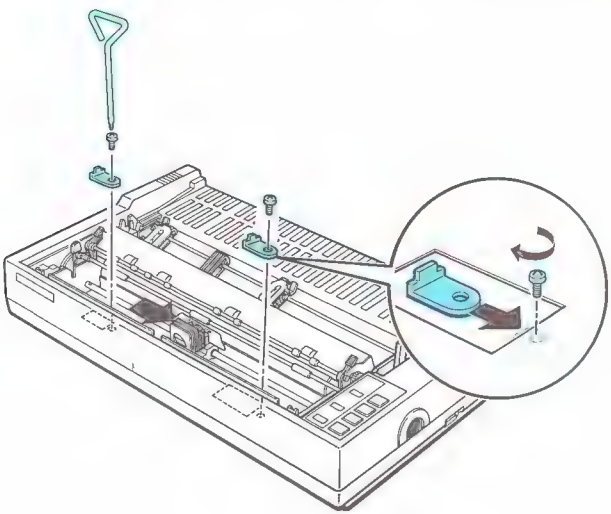


Do not unplug the power cable from the AC outlet before turning the printer off.

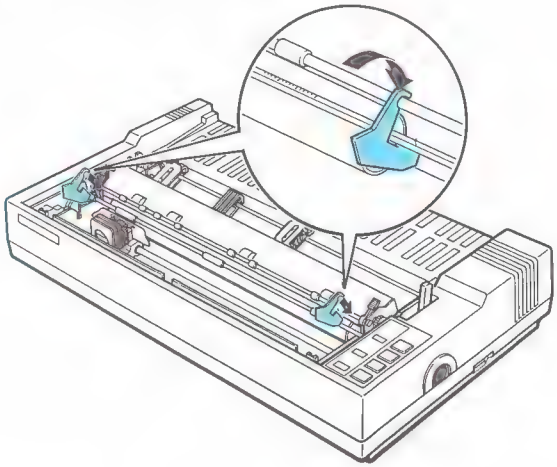
2. Remove the ribbon cartridge and platen knob.



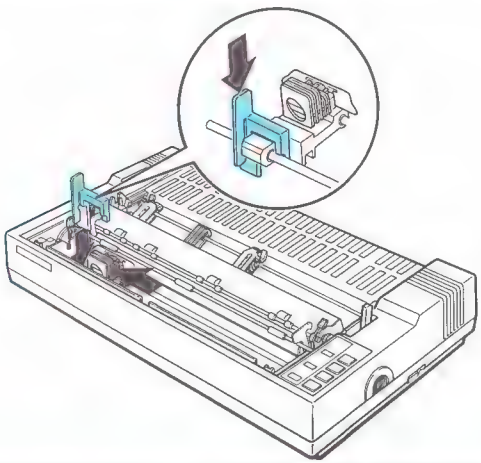
3. Slide the print head to the middle of the printer. Then, using a cross-head screw driver, reattach the two transport locking brackets.



4. Attach the left and right locking tabs.



5. Slide the print head all the way to the left, and insert the print head protector as shown below. Then, attach the printer cover.



After replacing the packing materials and putting the printer in its box, the repacking of the printer is completed.

Chapter 9 Technical Specifications

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Printer Specifications

Printing

Print method: 9-pin impact dot matrix

Print speed:

Quality	Pitch	Characters/second/line
High speed draft	10	290
Normal draft	10	220
	12	264
NLQ	10	45
	12	54

Printing direction: Bidirectional logic-seeking for text printing (unidirectional selectable by control code). Always unidirectional for graphics printing.

Line spacing: 1/6" or 1/8", or programmable in increments of 1/216th of an inch

Paper feed speed: (continuous feed)
Single sheet: 48 ms/line (3.6" per sec)
Continuous: 53 ms/line (3.0" per sec)

Printable columns:

Character pitch	Maximum printed characters	
	FX-850	FX-1050
10 pitch	80	136
10 pitch condensed	137	233
12 pitch	96	163
12 pitch condensed	160	272

Input buffer: 8 Kbyte

Character fonts:

Draft	High speed draft
	Normal draft
NLQ	Epson Roman
	Epson Sans Serif

Characters: 96 standard ASCII character set
(including italic characters)
13 international character sets
Epson Extended Graphics character set

Paper

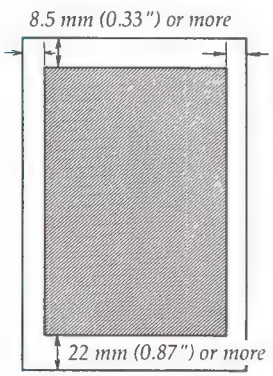
Paper width:

Paper	FX-850	FX-1050
Single Sheet	182 - 257 mm (7.2 - 10.1")	182 - 366 mm (7.2 - 14.4")
Continuous	101 - 254 mm (4 - 10")	101 - 406.4 mm (4 - 16")
Roll Paper	216 ±3 mm	not available
Envelope	166 or 240 mm	166 or 240 mm
Labels	2.5 or 4.0 inches	2.5 or 4.0 inches

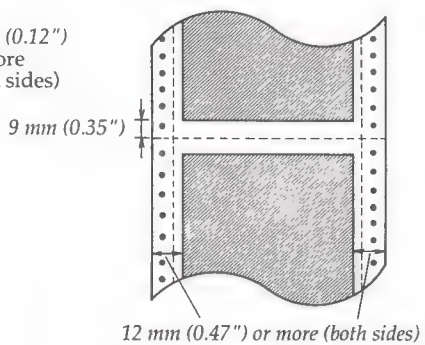
Paper Length: Single sheet
182 to 364 mm (7.2 to 14.3 inches)
Roll paper
Roll diameter not more than
127 mm (5 inches)

Printable area:

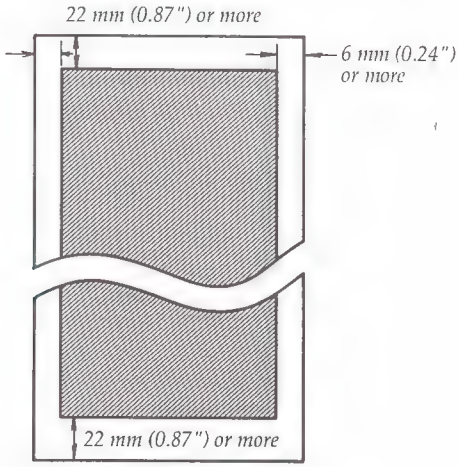
Single sheet, envelope



Continuous paper



Roll paper



Paper weight:

Continuous	14 lb - 22 lb
Multi-part forms	12 lb - 15 lb × N (N≦4)
Single Sheet:	14 lb - 22 lb
Roll paper:	14 lb - 22 lb
Envelope:	12 lb - 24 lb

Copy Capacity:

Up to 4 sheets including the original. Total thickness must not exceed 0.32 mm (0.012").

Mechanical

Paper feeding methods: Friction
Push tractor
Cut sheet feeder (optional)
Roll paper holder (optional)
Pull tractor (optional)

Ribbon: Cartridge ribbon, available in black only: #8750 (FX-850)
#8755(M) (FX-1050)

Life expectancy of ribbon:
3×10^6 characters (14 dots/character)

MCBF: For all components excluding print head: 5×10^6 lines

MTBF:

FX-850	4000 power-on hours
FX-1050	6000 power-on hours

Print head life: 100×10^6 characters (14 dots/character)

Dimensions and weight:

	FX-850	FX-1050
Height:	150 mm	150 mm
Width:	455 mm	630 mm
Depth:	360 mm	360 mm
Weight:	9.5 kg	12.5 kg

Electrical

Voltage:

120 VAC ±10% (120 V model)
220 VAC ±10 % (220 V model)
240 VAC ±10 % (240 V model)

Power consumption:

120 watts maximum

Frequency:

49.5 to 50.5 Hz (50 Hz version)
59.5 to 60.5 Hz (60 Hz version)

Insulation resistance:

10M ohms between AC power line and chassis

Dielectric strength (between AC line and chassis):

120 V model can withstand 1.0 kV rms applied for one minute or 1250 VAC rms applied for one second.
220/240 V model can withstand 1.5 kV rms applied for ten seconds or 1250 VAC applied for one minutes.

Environment

Temperature:

Operation:	5°C to 35°C
Storage:	–30°C to 60°C

Humidity:

Operation:	10% to 80% (without condensation)
Storage:	5% to 85% (without condensation)

Shock:

Operation:	Up to 1 G within 1 ms
Storage:	Up to 2 G within 1 ms

Vibration:

Operation:	Up to 0.25 G at up to 55 Hz
Storage:	Up to 0.50 G at up to 55 Hz

Interface Specifications

Your printer is equipped with an 8-bit parallel interface.
For specifications for optional interfaces, refer to the manuals provided with the optional interfaces.

Pin assignments for the parallel interface

Connector pin assignments and a description of their respective interface signals are shown in the following table.

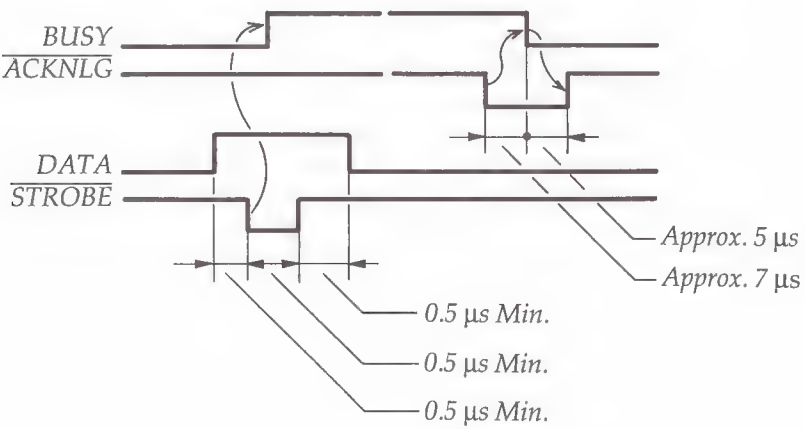
Signal Pin	Return Pin	Signal	Direction	Description
1	19	$\overline{\text{STROBE}}$	IN	STROBE pulse to read data. Pulse width must be more than 0.5 microseconds at the receiving terminal.
2 3 4 5 6 7 8 9	20 21 22 23 24 25 26 27	DATA 1 DATA 2 DATA 3 DATA 4 DATA 5 DATA 6 DATA 7 DATA 8	IN IN IN IN IN IN IN IN	These signals represent information of the 1st of 8th bits of parallel data, respectively. Each signal is at HIGH level when data is logical 1 and LOW when it is logical 0.
10	28	$\overline{\text{ACKNLG}}$	OUT	About a 12-microsecond pulse. LOW indicates that data has been received and that the printer is ready to accept more data.
11	29	BUSY	OUT	A HIGH signal indicates that the printer cannot receive data. The signal goes HIGH in the following cases: 1) During data entry (ea. char. time) 2) During printing 3) When off line 4) During printer-error state
12	30	PE	OUT	A HIGH signal indicates that the printer is out of paper.
13	–	–	–	Pulled up to 5 volts through 3.3K ohm resistance.

Signal Pin	Return Pin	Signal	Direction	Description
14	–	AUTO FEED XT	IN	When this signal is LOW, the paper is automatically fed 1 line after printing. (The signal level can be fixed to this by setting DIP switch 2-4 to ON.)
15	–	NC	–	Not used
16	–	GND	–	Logic ground level.
17	–	CHASSIS GND	–	Printer's chassis ground, which is isolated from the logic ground.
18	–	NC	–	Not used.
19-30	–	GND	–	Twisted-pair return signal ground level.
31	–	INIT	IN	When this level becomes LOW, the printer controller is reset to its power-up state and the print buffer is cleared. This level is normally HIGH; its pulse width must be more than 50 microseconds at the receiving terminal.
32	–	ERROR	OUT	This level becomes LOW when the printer is: 1) in paper out state. 2) off line. 3) in error state.
33	–	GND	–	Same as for Pins 19-30.
34	–	NC	–	Not used.
35	–	–	–	Pulled up to 5V through 3.3K ohm resistance.
36	–	SLCT IN	IN	The DC1/DC3 code is valid only when this signal is "HIGH". (Internal fixing can be carried out with Jumper J1. The level of this signal is factory-set to "LOW".)

- The column heading "Direction" refers to the direction of signal flow as viewed from the printer.
- "Return" denotes the twisted-pair return, to be connected at signal ground level. For the interface wiring, be sure to use a twisted-pair cable for each signal and to complete the connection on the return side. These cables should be shielded and connected to the chassis of the host computer and the printer.
- All interface conditions are based on TTL level. Both the rise and the fall times of each signal must be less than 0.2 microseconds.
- Data transfer must be carried out by observing the $\overline{\text{ACKNLG}}$ or BUSY signal. Data transfer to this printer can be carried out only after receipt of the $\overline{\text{ACKNLG}}$ signal or when the level of the BUSY signal is LOW.

Interface timing

The figure below shows the timing for the parallel interface.



Printing enabled/disabled signals and control conditions

The table below shows the relationship between printing being enabled or disabled, the on line/off line status, and the receipt of the data on/off control characters, DC1 or DC3.

ON LINE (Indicator on)	$\overline{\text{SLCT IN}}$	DC1/DC3 (Data on/off control)	$\overline{\text{ERROR}}$	BUSY	$\overline{\text{ACKNLG}}$	Printing (Disabled/ enabled)
on line	Low (J1 interface)	DC1/DC3 (no effect)	High	High/Low	Pulsed ea. char.	Enabled (normal cond.)
on line	High	DC1 Recv'd	High	High/Low	Pulsed ea. char.	Enabled
on line	High	DC3 Recv'd	High	High/Low	Pulsed ea. char.	Disabled*
off line	High/Low (no effect)	DC1/DC3 (no effect)	Low	High	Not generated	Disabled

* While printing is disabled, character data is being received and acknowledged so that the printer can look for another DC1 character, which would allow it to resume printing.

Initialization

There are three ways that the printer can be initialized (returned to a fixed set of conditions.)

Hardware initialization	• When the power is turned on. • When the printer receives an $\overline{\text{INIT}}$ signal at the parallel interface pin 31 goes LOW.
Software initialization	• Software sends the ESC @ (Initialize the printer) command.

Default Settings

The table below shows the default conditions that become valid when the printer is initialized.

Item	Reset to:
Top of form position	Current paper position
Left and right margins	Cancelled
Line spacing	1/6-inch line spacing
Vertical tab position	Cleared
Horizontal tab positions	Every eight characters
VFU channel	Channel 0
Font selection	Reset to the current SelecType setting.
Character pitch	Reset to the current SelecType setting.
Justification	Left justification
Special printing effects	Cancelled
Graphic mode assignment	ESC K = ESC * 0, ESC L = ESC * 1, ESC Y = ESC * 2, ESC Z = ESC * 3

In addition, the data buffer is cleared when the printer is initialized by turning on the power or by an $\overline{\text{INIT}}$ signal.

The user-defined character set is not cleared when the printer is initialized.

Chapter 10 Command Summary

EPSON ESC/P Command Summary 10-2

Command Summary

This chapter lists and describes all the commands available on your printer for both the Epson ESC/P and IBM emulation modes. The Command Summary is divided by topic, but there is a list of the commands in numerical order beginning on page 10-6. If you know which command you are looking for, consult this list to find the page number where it is described.

The Quick Reference Card at the end of this book contains a list of the commands divided by topic, with page references that direct you to full explanations of the commands.

The commands described in this summary are divided into the following subject categories:

Printer operation	Print enhancement
Data control	Word processing
Vertical motion	Character tables
Horizontal motion	User-defined characters
Overall printing style	Graphics
Character pitch and size	

Each command has a format section and a comments section. The format section gives the ASCII, decimal, and hexadecimal codes for this command. The comments section describes the effect of the command and gives any additional information necessary for using it.

The format section includes:

ASCII:	the sequence in standard ASCII characters
Decimal:	the sequence in decimal numbers
Hexadecimal:	the sequence in hexadecimal numbers

All three formats are equivalent, so you can pick the one best suited to your purpose. For instance, a BASIC programmer might refer to the first and second formats, a word processor might use the second, and a machine code programmer would use the third format. Variables are represented by italicized letters such as *n*, *n1*, *m*. The variables are explained in the comments section.

Some application programs make use of control key sequences. See the Control key chart on page 10-5 of this chapter.

For the following commands that use only 0 or 1 for the variable, either the ASCII codes 0 and 1 or the ASCII characters 0 and 1 can be used:

ESC U, ESC x, ESC p, ESC S, ESC -, ESC s,
ESC %, ESC t, ESC W, and ESC w.

For example, in BASIC you can turn on double-width printing with either of these statements:

```
LPRINT CHR$(27);"W";CHR$(1)      ASCII code
LPRINT CHR$(27);"W";"1"          ASCII character
```

These BASIC commands correspond to the printer commands below:

ESC W SOH or ESC W1

Examples

The simplest type of command consists of sending a single character to the printer. For instance, to print in condensed mode, you send the code 15. The code format is:

ASCII code:	SI
Decimal:	15
Hexadecimal:	0F

More complex commands consist of two or more character codes. For example, to print in proportional mode the code format is:

ASCII:	ESC	p	*n*
Decimal:	27	112	*n*
Hexadecimal:	1B	70	*n*

In this case, *n* can be either 1(ON) or 0 (OFF), to begin or end proportional printing. To turn ON proportional printing from BASIC, the command is:

```
LPRINT CHR$(27);CHR$(112);CHR$(1);
```

Control key chart

Some application programs use control key codes for decimal values 0-27. The table below gives you the proper values. The Control Key column indicates that you press the control key at the same time you press the key for the letter or symbol in that column. For example, you press the control key and A at the same time to send the value 1.

Some application programs that use this system cannot use control-@, and many programs use the control keys for other purposes.

Dec.	Hex.	Ctrl. Key
0	00	@
1	01	A
2	02	B
3	03	C
4	04	D
5	05	E
6	06	F
7	07	G
8	08	H
9	09	I
10	0A	J
11	0B	K
12	0C	L
13	0D	M

Dec.	Hex.	Ctrl. Key
14	0E	N
15	0F	O
16	10	P
17	11	Q
18	12	R
19	13	S
20	14	T
21	15	U
22	16	V
23	17	W
24	18	X
25	19	Y
26	1A	Z
27	1B	[

Commands in Numerical Order

The following list shows control codes and ESC sequences (with their decimal and hexadecimal values), and the page number where the complete command can be found.

Modes		ASCII	Dec.	Hex	Description	Page
ESC/P	IBM	BEL	7	07	Beeper	10-15
ESC/P	IBM	BS	8	08	Backspace	10-25
ESC/P	IBM	HT	9	09	Tab Horizontally	10-26
ESC/P	IBM	LF	10	0A	Line Feed	10-18
ESC/P	IBM	VT	11	0B	Tab Vertically	10-22
ESC/P	IBM	FF	12	0C	Form Feed	10-16
ESC/P	IBM	CR	13	0D	Carriage Return	10-15
ESC/P	IBM	SO	14	0E	Select Double-width Mode (one line)	10-33
ESC/P	IBM	SI	15	0F	Select Condensed Mode	10-32
ESC/P	IBM	DC1	17	11	Select Printer	10-10
ESC/P		DC2	18	12	Cancel Condensed Mode	10-33
	IBM	DC2	18	12	Select 10 Pitch	10-30
ESC/P		DC3	19	13	Deselect Printer	10-11
ESC/P	IBM	DC4	20	14	Cancel Double-width Mode (one line)	10-34
ESC/P	IBM	CAN	24	18	Cancel Line	10-15
ESC/P	IBM	ESC SO	14	0E	Select Double-width Mode (one line)	10-34
ESC/P	IBM	ESC SI	15	0F	Select Condensed Mode	10-33
ESC/P		ESC EM	25	19	Turn Cut Sheet Feeder Mode On/Off	10-13
ESC/P		ESC SP	32	20	Set Intercharacter Space	10-40
ESC/P		ESC !	33	21	Master Select	10-29
ESC/P		ESC #	35	23	Cancel MSB Control	10-14

Modes		ASCII	Dec.	Hex	Description	Page
ESC/P		ESC $	36	24	Set Absolute Print Position	10-25
ESC/P		ESC %	37	25	Select User-defined Set	10-44
ESC/P		ESC &	38	26	Define User-defined Characters	10-43
ESC/P		ESC *	42	2A	Select Graphics Mode	10-47
ESC/P	IBM	ESC -	45	2D	Turn Underlining Mode ON/Off	10-39
ESC/P		ESC /	47	2F	Select Vertical Tab Channel	10-23
ESC/P	IBM	ESC 0	48	30	Select 1/8-inch Line Spacing	10-18
ESC/P	IBM	ESC 1	49	31	Select 7/72-inch Line Spacing	10-19
ESC/P		ESC 2	50	32	Select 1/6-inch Line Spacing	10-19
	IBM	ESC 2	50	32	Select ESC A Line Spacing	10-19
ESC/P	IBM	ESC 3	51	33	Set *n*/216-inch Line Spacing	10-20
ESC/P		ESC 4	52	34	Select Italic Mode	10-38
	IBM	ESC 4	52	34	Set Top of Form	10-18
ESC/P		ESC 5	53	35	Cancel Italic Mode	10-38
	IBM	ESC 5	53	35	Turn Automatic Line Feed On/Off	10-21
ESC/P	IBM	ESC 6	54	36	Enable Printable Characters	10-41
ESC/P	IBM	ESC 7	55	37	Enable Upper Control Codes	10-41
ESC/P		ESC 8	56	38	Disable Paper Out Detection	10-13
ESC/P		ESC 9	57	39	Enable Paper Out Detection	10-13
ESC/P		ESC :	58	3A	Copy ROM to RAM	10-43
	IBM	ESC :	58	3A	Select 12 Pitch	10-31
ESC/P		ESC <	60	3C	Select Unidirectional Mode (one line)	10-12
ESC/P		ESC =	61	3D	Set MSB to 0	10-14
	IBM	ESC =	61	3D	Define User-defined Characters	10-44

Mode		ASCII	Dec.	Hex	Description	Page
ESC/P		ESC >	62	3E	Set MSB to 1	10-14
ESC/P		ESC ?	63	3F	Reassign Graphics Mode	10-47
ESC/P		ESC @	64	40	Initialize Printer	10-10
ESC/P		ESC A	65	41	Set *n*/72-inch Line Spacing	10-20
	IBM	ESC A	65	41	Set *n*/72-inch Line Spacing	10-20
ESC/P	IBM	ESC B	66	42	Set Vertical Tabs	10-22
ESC/P	IBM	ESC C	67	43	Set Page Length in Lines	10-16
ESC/P	IBM	ESC C 0	67	43	Set Page Length in Inches	10-17
ESC/P	IBM	ESC D	68	44	Set Horizontal Tabs	10-27
ESC/P	IBM	ESC E	69	45	Select Emphasized Mode	10-36
ESC/P	IBM	ESC F	70	46	Cancel Emphasized Mode	10-36
ESC/P	IBM	ESC G	71	47	Select Double-strike Mode	10-36
ESC/P	IBM	ESC H	72	48	Cancel Double-strike Mode	10-37
ESC/P		ESC I	73	49	Printable Code Area Expansion	10-44
	IBM	ESC I	73	49	Select Font	10-29
ESC/P	IBM	ESC J	74	4A	Perform *n*/216-inch Line Feed	10-21
ESC/P	IBM	ESC K	75	4B	Select Single-density Graphics Mode	10-45
ESC/P	IBM	ESC L	76	4C	Select Double-density Graphics Mode	10-46
ESC/P		ESC M	77	4D	Select 12 pitch	10-30
ESC/P	IBM	ESC N	78	4E	Set Skip Over Perforation	10-17
ESC/P	IBM	ESC O	79	4F	Cancel Skip Over Perforation	10-17
ESC/P		ESC P	80	50	Select 10 pitch	10-30
	IBM	ESC P	80	50	Turn Proportional Mode On/Off	10-32
ESC/P		ESC Q	81	51	Set Right Margin	10-24
	IBM	ESC Q	81	51	Deselect Printer	10-11
ESC/P		ESC R	82	52	Select an International Character Set	10-41
	IBM	ESC R	82	52	Reset all Tabs	10-27
ESC/P	IBM	ESC S 0	83	53	Select Superscript Mode	10-37
ESC/P	IBM	ESC S 1	83	53	Select Subscript Mode	10-37
ESC/P	IBM	ESC T	84	54	Cancel Superscript/ Subscript Mode	10-38

Mode		ASCII	Dec.	Hex	Description	Page
ESC/P	IBM	ESC U	85	55	Turn Unidirectional Mode On/Off	10-12
ESC/P	IBM	ESC W	87	57	Turn Double-width Mode On/Off	10-34
	IBM	ESC X	88	58	Set Left and Right Margins	10-24
ESC/P	IBM	ESC Y	89	59	Select High-speed Double-density Graphics Mode	10-46
ESC/P	IBM	ESC Z	90	5A	Select Quadruple-density Graphics Mode	10-46
	IBM	ESC [@	91	5B	Set Double-height, Double-width Mode	10-35
ESC/P		ESC \	92	5C	Set Relative Print Position	10-26
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Commands Arranged By Topics

The following section lists and describes all the commands by topics. See the Quick Reference Card at the end of this book for the list of commands by topic.

Printer Operation

ESC @ ESC/P — Initialize Printer

Format:

ASCII code:	ESC	@
Decimal:	27	64
Hexadecimal:	1B	40

Comments:

Resets the printer mode and clears the current print line preceding the command.

DC1 ESC/P · IBM — Select Printer

Format:

ASCII code:	DC1
Decimal:	17
Hexadecimal:	11

Comments:

Return the printer to the selected state if it has been deselected by the printer deselect code (DC3). Does not select the printer if it has been switched to off line by pressing the ON LINE button.

DC3 ESC/P — Deselect Printer

Format:

ASCII code:	DC3
Decimal:	19
Hexadecimal:	13

Comments:

Puts the printer into the deselected state until the select printer code (DC1) is received. The printer cannot be reselected with the ON LINE button.

ESC Q IBM — Deselect Printer

Format:

ASCII code:	ESC	Q	*n*
Decimal:	27	81	*n*
Hexadecimal:	1B	51	*n*

Comments:

Provides a means of selectively deselecting a specific printer. *n* can take either of the following values:

3: Deselects the printer if it is the FX-850.
22: Deselects the printer if it is the FX-1050.

ESC s ESC/P — Turn Half-speed Mode On/Off

Format:

ASCII code:	ESC	s	*n*
Decimal:	27	115	*n*
Hexadecimal:	1B	73	*n*

Comments:

The following values can be used for *n*.

1: Mode is turned ON.
0: Mode is turned OFF.

ESC < ESC/P Select Unidirectional Mode (one line)

Format:

ASCII code:	ESC	<
Decimal:	27	60
Hexadecimal:	1B	3C

Comments:

Printing is normally bidirectional. This command selects unidirectional printing for one line only. (It is cancelled by a carriage return.) The print head moves to the extreme left (home) position and printing takes place from left to right.

ESC U ESC/P · IBM Turn Unidirectional Mode On/Off

Format:

ASCII code:	ESC	U	*n*
Decimal:	27	85	*n*
Hexadecimal:	1B	55	*n*

Comments:

The following values can be used for *n*:
1: Mode is turned ON.
0: Mode is turned OFF.
Printing is normally bidirectional. This command selects unidirectional printing for more accurate positioning.

ESC 8 ESC/P Disable Paper Out Detection

Format:

ASCII code:	ESC	8
Decimal:	27	56
Hexadecimal:	1B	38

Comments:

Disables paper out detection. When disabled, the printer does not stop printing even when it runs out of paper.

ESC 9 ESC/P Enable Paper Out Detection

Format:

ASCII code:	ESC	9
Decimal:	27	57
Hexadecimal:	1B	39

Comments:

Enables paper out detection. When paper out detection is enabled, the printer automatically stops printing when it runs out of paper.

ESC EM ESC/P Turn Cut Sheet Feeder Mode On/Off

Format:

ASCII code:	ESC	EM	*n*
Decimal:	27	25	*n*
Hexadecimal:	1B	19	*n*

Comments:

The following values can be used for *n*:
0: Mode is turned OFF.
1: Selects bin 1.
2: Selects bin 2.
4: Mode is turned ON.
R: Ejects a sheet (no sheet loaded from selected bin)

This command should not be used unless the cut sheet feeder has been installed. It is only supported in the CSF mode, and values other than 0, 1, 2, 4, or R are ignored. On/Off control can also be handled with DIP switch 2-2.

ESC = ESC/P — Set MSB to 0

Format:

ASCII code:	ESC	=
Decimal:	27	61
Hexadecimal:	1B	3D

Comments:

Set the MSB of all incoming data to 0. Some computers always send data with the MSB set to 1, which means that italics or character graphics will always be printed. ESC = can overcome this problem. This command does not work for graphics or user-defined characters

ESC > ESC/P — Set MSB to 1

Format:

ASCII code:	ESC	>
Decimal:	27	62
Hexadecimal:	1B	3E

Comments:

Set the MSB bit of all incoming data as 1. This command does not work for graphics or user-defined characters.

ESC # ESC/P — Cancel MSB Control

Format:

ASCII code:	ESC	#
Decimal:	27	35
Hexadecimal:	1B	23

Comments:

Cancels the MSB control set by ESC = or ESC >.

BEL ESC/P · IBM Beeper

Format:
ASCII code: BEL
Decimal: 7
Hexadecimal: 07

Comments:
Sounds the printer's beeper.

Data Control

CR ESC/P · IBM Carriage Return

Format:
ASCII code: CR
Decimal: 13
Hexadecimal: 0D

Comments:
Prints the data in the print buffer and returns the print position to the left margin. A line feed may be added if the AUTO FEED $\overline{XT}$ line on the parallel interface is held LOW.

CAN ESC/P · IBM Cancel Line

Format:
ASCII code: CAN
Decimal: 24
Hexadecimal: 18

Comments:
Removes all text on the print line, but does not affect control codes.

DEL ESC/P Delete Character

Format:

ASCII code:	DEL
Decimal:	127
Hexadecimal:	7F

Comments:

Removes the last text character on the print line but does not affect control codes.

Vertical Motion

FF ESC/P · IBM Form Feed

Format:

ASCII code:	FF
Decimal:	12
Hexadecimal:	0C

Comments:

Prints the data in the print buffer and advances the paper to the top of the next form according to the current page length.

ESC C ESC/P · IBM Set Page Length in Lines

Format:

ASCII code:	ESC	C	*n*
Decimal:	27	67	*n*
Hexadecimal:	1B	43	*n*

Comments:

Sets the page length to *n* lines in the current line spacing. The value of *n* must be from 1-127 lines. The top of form position is set to the current line. Overrides the DIP switch page length setting.

ESC C 0 ESC/P · IBM — Set Page Length in Inches

Format:

ASCII code:	ESC	C	0	*n*
Decimal:	27	67	0	*n*
Hexadecimal:	1B	43	00	*n*

Comments:

Sets the page length to *n* inches. The value of *n* must be from 1-22. The top of form position is set to the current line. Overrides the DIP switch page length setting.

ESC N ESC/P · IBM — Set Skip Over Perforation

Format:

ASCII code:	ESC	N	*n*
Decimal:	27	78	*n*
Hexadecimal:	1B	4E	*n*

Comments:

The variable *n* is the number of lines skipped between the last line printed on one page and the first line on the next page. For example, with the standard setting for line spacing (1/6-inch), and page length (66 lines), ESC N 6 prints 60 lines and then skips 6. This setting is cancelled by ESC O, ESC C, or ESC C 0. The value of *n* must be from 1-127.
Overrides the DIP switch 2-3 for the 1-inch skip over perforation setting.

ESC O ESC/P · IBM — Cancel Skip Over Perforation

Format:

ASCII code:	ESC	O
Decimal:	27	79
Hexadecimal:	1B	4F

Comments:

Cancels the skip over perforation set by ESC N. Also, cancels the DIP switch 1-inch skip over perforation setting.

ESC 4 IBM — Set Top of Form

Format:

ASCII code:	ESC	4
Decimal:	27	52
Hexadecimal:	1B	34

Comments:

Sets the current paper position as the top of form. Subsequently, the paper advances to the top of form position on the next page whenever time it receives the Form Feed code (FF).

LF ESC/P · IBM — Line Feed

Format:

ASCII code:	LF
Decimal:	10
Hexadecimal:	0A

Comments:

When this command is received, the data in the print buffer is printed and the paper advances one line in the current line spacing.

ESC 0 ESC/P · IBM — Select 1/8-inch Line Spacing

Format:

ASCII code:	ESC	0
Decimal:	27	48
Hexadecimal:	1B	30

Comments:

Sets the line spacing to 1/8 of an inch for subsequent line feed commands. The 0 is the digit zero and not ASCII code O.

ESC 1 ESC/P · IBM — Select 7/72-inch Line Spacing

Format:

ASCII code:	ESC	1
Decimal:	27	49
Hexadecimal:	1B	31

Comments:

Sets the line spacing to 7/72 of an inch for subsequent line feed commands. The 1 is the digit one and not ASCII code 1.

ESC 2 ESC/P — Select 1/6-inch Line Spacing

Format:

ASCII code:	ESC	2
Decimal:	27	50
Hexadecimal:	1B	32

Comments:

Sets the line spacing to 1/6 of an inch for subsequent line feed commands. The two is the digit two and not ASCII code 2. This is the default at power on.

ESC 2 IBM — Select ESC A Line Spacing

Format:

ASCII code:	ESC	2
Decimal:	27	50
Hexadecimal:	1B	32

Comments:

Sets the line spacing to the distance specified by ESC A *n*.

ESC 3 ESC/P · IBM — Set *n*/216-inch Line Spacing

Format:

ASCII code:	ESC	3	*n*
Decimal:	27	51	*n*
Hexadecimal:	1B	33	*n*

Comments:

Sets the line spacing to *n*/216 of an inch for subsequent line feed commands. The 3 is the digit three and not ASCII code 3. The value of *n* must be from 0-255.

ESC A ESC/P — Set *n*/72-inch Line Spacing

Format:

ASCII code:	ESC	A	*n*
Decimal:	27	65	*n*
Hexadecimal:	1B	41	*n*

Comments:

Sets the line spacing to *n*/72 of an inch for subsequent line feed commands. The value of *n* must be from 0-85.

ESC A IBM — Set *n*/72-inch Line Spacing

Format:

ASCII code:	ESC	A	*n*
Decimal:	27	65	*n*
Hexadecimal:	1B	41	*n*

Comments:

Sets the line spacing to *n*/72 of an inch. This value is stored in memory until the printer receives the ESC 2 command to put it into effect. The value of *n* must be from 0-85.

ESC J ESC/P · IBM — Perform *n*/216-inch Line Feed

Format:

ASCII code:	ESC	J	*n*
Decimal:	27	74	*n*
Hexadecimal:	1B	4A	*n*

Comments:

Advances the paper *n*/216 of an inch. The value of *n* must be from 0-255. This command produces an immediate line feed but does not affect subsequent line spacing and does not produce a carriage return.

ESC 5 IBM — Turn Automatic Line Feed On/Off

Format:

ASCII code:	ESC	5	*n*
Decimal:	27	53	*n*
Hexadecimal:	1B	35	*n*

Comments:

Sets or resets the automatic line feed function. The following values can be used for *n*.

0: Resets (disables) automatic line feeds.

1: Sets (enables) automatic line feeds, causing the paper to advance by the current line spacing each time CR is received.

This command duplicates the function of DIP switch 2-4.

VT — ESC/P · IBM — Tab Vertically

Format:

ASCII code:	VT
Decimal:	11
Hexadecimal:	0B

Comments:

Advances the paper to the next vertical tab position. If no vertical tabs have been set, the paper advances one line.

ESC B — ESC/P · IBM — Set Vertical Tabs

Format:

ASCII code:	ESC	B	*n1*	*n2*	...	0
Decimal:	27	66	*n1*	*n2*	...	0
Hexadecimal:	1B	42	*n1*	*n2*	...	00

Comments:

Sets up to 16 vertical tabs in the current line spacing. Tab settings are not affected by subsequent changes in line spacing. The tab settings are entered as *n1*, *n2*, etc., all from 1-225, in ascending order. The 0 character indicates the end of the command. ESC B 0 clears the tab settings.

ESC b — ESC/P — Set Vertical Tabs in Channels

Format:

ASCII code:	ESC	b	*c*	*n1*	*n2*	...	0
Decimal:	27	98	*c*	*n1*	*n2*	...	0
Hexadecimal:	1B	62	*c*	*n1*	*n2*	...	0

Comments:

Function the same as ESC B, except that the variable *c* selects a channel for the vertical tabs, which must be between 0-7. Therefore, up to eight sets of vertical tabs can be set. The channels are selected by ESC /. To clear the tabs in channel *c*, use ESC b *c* 0.

ESC / ESC/P — Select Vertical Tab Channel

Format:

ASCII code:	ESC	/	*c*
Decimal:	27	47	*c*
Hexadecimal:	1B	2F	*c*

Comments:

This command is used to select the vertical tab channel, with the value of *c* from 0-7. All subsequent VT commands use the channel selected by this command. If no channel has been selected, channel 0 is used.

Horizontal Motion

ESC l ESC/P — Set Left Margin

Format:

ASCII code:	ESC	l	*n*
Decimal:	27	108	*n*
Hexadecimal:	1B	6C	*n*

Comments:

Sets the left margin to *n* columns in the current character size. Settings made in the proportional mode are treated as 10 pitch. This command clears previous tab settings and all previous characters in the print line. Use lowercase l (for left), not the numeral one. The minimum space between the margins is the width of one double-width 10 pitch character.

ESC Q ESC/P — Set Right Margin

Format:

ASCII code:	ESC	Q	*n*
Decimal:	27	81	*n*
Hexadecimal:	1B	51	*n*

Comments:

Sets the right margin to *n* columns in the current character size. Settings made in the proportional mode are treated as 10 pitch. This command clears previous tab settings and all previous characters in the print line. The minimum space between the margins is the width of one double-width 10 pitch character.

ESC X IBM — Set Left and Right Margins

Format:

ASCII code:	ESC	X	*n1*	*n2*
Decimal:	27	88	*n1*	*n2*
Hexadecimal:	1B	58	*n1*	*n2*

Comments:

The left margin column is set to *n1* in the current pitch, ignoring double-width, and the right margin column is set to *n2*. The first column is number 1, not number 0.

BS ESC/P · IBM Backspace

Format:

ASCII code:	BS
Decimal:	8
Hexadecimal:	08

Comments:

Prints out data in the print buffer, then moves the print position one space to the left. Backspacing can be performed up to, but not beyond, the left margin setting. The BS code is also ignored if ESC a 2 or ESC a 3 has been sent. If this code is received immediately after graphics printing, the print position of subsequent data is moved back to the point at which graphics printing started.

ESC $ ESC/P Set Absolute Print Position

Format:

ASCII code:	ESC	$	*n1*	*n2*
Decimal:	27	36	*n1*	*n2*
Hexadecimal:	1B	24	*n1*	*n2*

Comments:

This sequence specifies the distance from the left margin that subsequent characters are to be printed, using this formula: total number of dots = $n1 + (n2 \times 256)$. Each unit equals 1/60th of an inch. The sequence is ignored and the previous setting remains effective if the position specified is beyond the right margin.

ESC \ ESC/P — Set Relative Print Position

Format:

ASCII code:	ESC	\	*n1*	*n2*
Decimal:	27	92	*n1*	*n2*
Hexadecimal:	1B	5C	*n1*	*n2*

Comments:

Determines the position (relative to the current position) at which printing of following data will start. To find *n1* and *n2*, first calculate the displacement required in dots. If the displacement is to the left, subtract it from 65536. Send the resulting number using this formula: total number of dots = *n1* + 120th of an inch.

HT ESC/P · IBM — Tab Horizontally

Format:

ASCII code:	HT
Decimal:	9
Hexadecimal:	09

Comments:

Advances the print position to the next horizontal tab position.

ESC D ESC/P · IBM — Set Horizontal Tabs

Format:

ASCII code:	ESC	D	*n1*	*n2*	...	0
Decimal:	27	68	*n1*	*n2*	...	0
Hexadecimal:	1B	44	*n1*	*n2*	...	00

Comments:

This command allows setting of up to 32 horizontal tabs, which are entered as *n1*, *n2*, *n3*, etc. (from 1-255) with the 0 character terminating the command. The tab settings must be entered in ascending order. ESC D 0 clears all tabs. The settings on power up or after an ESC @ command are after every eight characters. The tab do not change if the character size is changed, and for proportional printing the size of 10 pitch characters determines the tab positions.

ESC R IBM — Reset all Tabs

Format:

ASCII code:	ESC	R
Decimal:	27	82
Hexadecimal:	1B	52

Comments:

Resets all vertical and horizontal tab stops. Subsequently, horizontal tabs are set in every eighth column, and all vertical tabs are cleared.

Overall Printing Style

ESC x ESC/P — Select Near Letter Quality or Draft

Format:

ASCII code:	ESC	x	*n*
Decimal:	27	120	*n*
Hexadecimal:	1B	78	*n*

Comments:

The following values can be used for *n*:
0: Selects the draft mode
1: Selects the Near Letter Quality (NLQ) mode
Overrides the SelecType panel setting. When NLQ is selected, the font used for printing is either Roman or Sans serif, whichever is currently selected.

ESC k ESC/P — Select Typestyle Family

Format:

ASCII code:	ESC	k	*n*
Decimal:	27	107	*n*
Hexadecimal:	1B	6B	*n*

Comments:

This command effects only the Near Letter Quality Type Style, not draft.
The following values can be used for *n*:
0 : Roman
1 : Sans Serif
Overrides the SelecType panel setting.

ESC ! ESC/P — Master Select

Format:

ASCII code:	ESC	!	*n*
Decimal:	27	33	*n*
Hexadecimal:	1B	21	*n*

Comments:

Selects any valid combination of the following modes: 10 pitch, 12 pitch, proportional, condensed, emphasized, double-strike, double-width, italic, and underlined. For details on how to set *n*, see the section on selecting type styles with Master Select in Chapter 4.

ESC I IBM — Select Font

Format:

ASCII code:	ESC	I	*n*
Decimal:	27	73	*n*
Hexadecimal:	1B	49	*n*

Comments:

Selects the font according to the value specified for *n*. *n* can assume any one of the following values.

0: Normal quality 10 pitch font
1: Normal quality 12 pitch font
2: Near letter quality Sans serif font
3: Near letter quality Roman font
4: Normal quality 10 pitch user-defined font
5: Normal quality 12 pitch user-defined font
6: Near letter quality 10 pitch user-defined font
7: Near letter quality 12 pitch user-defined font

Character pitch and size

ESC P ESC/P — Select 10 pitch

Format:

ASCII code:	ESC	P
Decimal:	27	80
Hexadecimal:	1B	50

Comments:

Selects 10 pitch (10 characters per inch). Because 10 pitch is the default pitch, this command is normally used to cancel 12 pitch.

ESC M ESC/P — Select 12 pitch

Format:

ASCII code:	ESC	M
Decimal:	27	77
Hexadecimal:	1B	4D

Comments:

Selects 12 pitch (12 characters per inch).

DC2 IBM — Select 10 pitch

Format:

ASCII code:	DC2
Decimal:	18
Hexadecimal:	12

Comments:

Cancels condensed, elite, and proportional printing and selects 10 pitch printing. The command does not cancel double-width.

ESC : IBM — Select 12 pitch

Format:

ASCII code:	ESC	:
Decimal:	27	58
Hexadecimal:	1B	3A

Comments:

Selects 12 pitch (12 characters per inch).

ESC p ESC/P — Turn Proportional Mode On/Off

Format:

ASCII code:	ESC	p	*n*
Decimal:	27	112	*n*
Hexadecimal:	1B	70	*n*

Comments:

The following values can be used for *n*:
1: Mode is turned ON.
0: Mode is turned OFF.
The width of proportional characters varies from characters to character. Therefore, a narrow letter like i receives less space than a wide letter like W. The proportional widths are given in the character table, which appears in Appendix.

ESC P IBM — Turn Proportional Mode On/Off

Format:

ASCII code:	ESC	P	*n*
Decimal:	27	80	*n*
Hexadecimal:	1B	50	*n*

Comments:

The following values can be used for *n*:
1: Mode is turned ON.
0: Mode is turned OFF.
The width of proportional characters varies from character to character. Therefore, a narrow letter like i receives less space than a wide letter like W. This command overrides condensed, 10 pitch, and 12 pitch.

SI ESC/P · IBM — Select Condensed Mode

Format:

ASCII code:	SI
Decimal:	15
Hexadecimal:	0F

Comments:

Prints characters at about 60 percent of their normal width. For example, the condensed 10 pitch mode has 17 characters per inch. Proportional mode cannot be condensed, and proportional will override condensed.

ESC SI — ESC/P · IBM — Select Condensed Mode

Format:

ASCII code:	ESC	SI
Decimal:	27	15
Hexadecimal:	1B	0F

Comments:

Duplicates the SI command and the function of the condensed button on the control panel.

DC2 — ESC/P — Cancel Condensed Mode

Format:

ASCII code:	DC2
Decimal:	18
Hexadecimal:	12

Comments:

Cancels condensed mode set by SI, ESC SI, or SelecType and returns printing to normal.

SO — ESC/P · IBM — Select Double-width Mode (one line)

Format:

ASCII code:	SO
Decimal:	14
Hexadecimal:	0E

Comments:

Double-width mode doubles the width of all characters. This mode is cancelled by LF, FF, VT or DC4.

ESC SO ESC/P · IBM Select Double-width Mode (one line)

Format:

ASCII code:	ESC	SO
Decimal:	27	14
Hexadecimal:	1B	0E

Comments:

Duplicates the SO command.

DC4 ESC/P · IBM Cancel Double-width Mode (one line)

Format:

ASCII code:	DC4
Decimal:	20
Hexadecimal:	14

Comments:

Cancels the one-line double-width mode selected by SO or ESC SO, but not double-width mode selected by ESC W or ESC !.

ESC W ESC/P · IBM Turn Double-width Mode On/Off

Format:

ASCII code:	ESC	W	*n*
Decimal:	27	87	*n*
Hexadecimal:	1B	57	*n*

Comments:

The following values can be used for *n*:
1: Mode is turned ON.
0: Mode is turned OFF.
Double-width mode doubles the width of all characters.

ESC w ESC/P Turn Double-height Mode On/Off

Format:

ASCII code:	ESC	w	*n*
Decimal:	27	119	*n*
Hexadecimal:	1B	77	*n*

Comments:

The following values can be used for *n*:
1: Mode is turned ON.
0: Mode is turned OFF.
Double-height mode doubles the height of all characters.
Super/subscript and condensed modes are not valid in the double-height mode.

ESC [@ IBM Select Double-height, Double-width Mode

Format:

ASCII code:	ESC	[	@	*n1*	*n2*	*m1*	*m2*	*m3*	*m4*
Decimal:	27	91	64	*n1*	*n2*	*m1*	*m2*	*m3*	*m4*
Hexadecimal:	1B	5B	40	*n1*	*n2*	*m1*	*m2*	*m3*	*m4*

Comments:

The following values must be used: *n1* = 4, *n2* = 0, *m1* = 0, and *m2* = 0. The value of *m3* affects both character height and line feed as shown below:

m3	Char height	Line feed
1	Standard	Unchanged
2	Double-height	Unchanged
16	Unchanged	Single
17	Standard	Single
18	Double-height	Single
32	Unchanged	Double
33	Standard	Double
34	Double-height	Double

The value of *m4* selects the width of the characters.

1: Standard
2: Double-width

Print Enhancement

ESC E — ESC/P · IBM — Select Emphasized Mode

Format:

ASCII code:	ESC	E
Decimal:	27	69
Hexadecimal:	1B	45

Comments:

Makes text bolder by printing each dot twice, with the second dot slightly to the right of the first.

ESC F — ESC/P · IBM — Cancel Emphasized Mode

Format:

ASCII code:	ESC	F
Decimal:	27	70
Hexadecimal:	1B	46

Comments:

Cancels the emphasized mode selected by ESC E.

ESC G — ESC/P · IBM — Select Double-strike Mode

Format:

ASCII code:	ESC	G
Decimal:	27	71
Hexadecimal:	1B	47

Comments:

Makes text bolder by printing each line twice, with the second printing slightly below the first. In NLQ mode, this mode is not available.

ESC H ESC/P · IBM — Cancel Double-strike Mode

Format:

ASCII code:	ESC	H
Decimal:	27	72
Hexadecimal	1B	48

Comments:

Cancels the double-strike mode selected by ESC G.

ESC S 0 ESC/P · IBM — Select Superscript Mode

Format:

ASCII code:	ESC	S	0
Decimal:	27	83	0
Hexadecimal:	1B	53	0

Comments:

Prints characters about two-thirds of the normal character height in the upper part of the character space.

ESC S 1 ESC/P · IBM — Select Subscript Mode

Format:

ASCII code:	ESC	S	1
Decimal:	27	83	1
Hexadecimal:	1B	53	1

Comments:

Prints characters about two-thirds of the normal character height in the lower part of the character space.

ESC T ESC/P · IBM Cancel Superscript/Subscript Mode

Format:

ASCII code:	ESC	T
Decimal:	27	84
Hexadecimal:	1B	54

Comments:

Cancels either superscript or subscript.

ESC 4 ESC/P Select Italic Mode

Format:

ASCII code:	ESC	4
Decimal:	27	52
Hexadecimal:	1B	34

Comments:

Causes characters from the italic character table to be printed. This command is valid even if the Epson Extended Graphics Character set has been selected by ESC t or by DIP switch 1-3, but the character graphics are not italicized.

ESC 5 ESC/P Cancel Italic Mode

Format:

ASCII code:	ESC	5
Decimal:	27	53
Hexadecimal:	1B	35

Comments:

Cancels the mode selected by ESC 4.

ESC - ESC/P · IBM — Turn Underlining Mode On/Off

Format:

ASCII code:	ESC	-	*n*
Decimal:	27	45	*n*
Hexadecimal:	1B	2D	*n*

Comments:

The following values can be used for *n*:
1: Mode is turned ON.
0: Mode is turned OFF.
This mode provides continuous underlining including spaces.

ESC _ IBM — Turn Overscoring Mode On/Off

Format:

ASCII code:	ESC	_	*n*
Decimal:	27	95	*n*
Hexadecimal:	1B	5F	*n*

Comments:

Starts or ends automatic overscoring. The following values can be used for *n*.
0: Ends automatic overscoring.
1: Starts automatic overscoring.

Word Processing

ESC a ESC/P — Select Justification

Format:

ASCII code:	ESC	a	*n*
Decimal:	27	97	*n*
Hexadecimal:	1B	61	*n*

Comments:

The following values can be used for *n*:
0: Selects left justification.
1: Selects centering.
2: Selects right justification.
3: Selects full justification.
The default setting is $n = 0$. Full justification ($n = 3$) is performed when the buffer becomes full; HT and BS are invalid except in $n = 0$ mode. For $n = 3$ there must be no carriage returns within a paragraph.

ESC SP ESC/P — Set Intercharacter Space

Format:

ASCII code:	ESC	SP	*n*
Decimal:	27	32	*n*
Hexadecimal:	1B	20	*n*

Comments:

Sets the amount of space to the right of each character, in addition to the space already allowed in the design of the character. The number of dots is determined by *n*, which should be from 0-127. Each unit of space is 1/120th of an inch.

Character Tables

ESC t ESC/P — Select Character Table

Format:

ASCII code:	ESC	t	*n*
Decimal:	27	116	*n*
Hexadecimal:	1B	74	*n*

Comments:

Selects the character table used by codes 128-255. Selecting Epson Extended Graphics Character does not disable italic printing. Italic printing can still be selected by ESC 4. The following values can be used for *n*:

0: Selects italics character table.

1: Selects Epson Extended Graphics character table.

Duplicates the function of DIP switch 1-3. Note that the value of *n* must equal 00 hex or 01 hex.

ESC R ESC/P — Select an International Character Set

Format:

ASCII code:	ESC	R	*n*
Decimal:	27	82	*n*
Hexadecimal:	1B	52	*n*

Comments:

The following values can be used for *n*:

0 = USA	7 = Spain I
1 = France	8 = Japan
2 = Germany	9 = Norway
3 = UK	10 = Denmark II
4 = Denmark I	11 = Spain II
5 = Sweden	12 = Latin America
6 = Italy	

Overrides the DIP switch settings of the international character set.

ESC 6 ESC/P · IBM — Enable Printable Characters

Format:

ASCII code:	ESC	6
Decimal:	27	54
Hexadecimal:	1B	36

Comments:

This code enables the printing of codes 128 through 159 (decimal) as characters, not control codes. See the Appendix for characters printed.

ESC 7 ESC/P · IBM — Enable Upper Control Codes

Format:

ASCII code:	ESC	7
Decimal:	27	55
Hexadecimal:	1B	37

Comments:

This code causes codes 128 through 159 to be treated as control codes. This is the default.

ESC \ IBM — Print Characters from Symbol Set

Format:

ASCII code:	ESC	\	*n1*	*n2*
Decimal:	27	92	*n1*	*n2*
Hexadecimal:	1B	5C	*n1*	*n2*

Comments:

Enables printing of any printable character assigned to codes below 32 for the next $(n2 \times 256)+n1$ characters received from the host computer.

ESC ^ IBM — Print One Character from Symbol Set

Format:

ASCII code:	ESC	^	*n*
Decimal:	27	94	*n*
Hexadecimal:	1B	5E	*n*

Comments:

Enables printing of any printable character assigned to codes below 32 for the next character received from the host computer.

User-defined characters

ESC & ESC/P — Define User-defined Characters

Format:

ASCII code:	ESC	&	0	*d1*	*d2*	...	*dn*
Decimal:	27	38	0	*d1*	*d2*	...	*dn*
Hexadecimal:	1B	26	00	*d1*	*d2*	...	*dn*

Comments:

This command allows characters to be defined.
This command is not effective when DIP switch 1-1 is ON.

ESC : ESC/P — Copy ROM to RAM

Format:

ASCII code:	ESC	:	0	*n*	0
Decimal:	27	58	0	*n*	0
Hexadecimal:	1B	3A	00	*n*	0

Comments:

This code copies the characters in ROM to RAM so that specific characters can be redefined.
One of the NLQ fonts (Roman or Sans Serif) is copied depending on the value specified for *n*.
0: Roman
1: Sans Serif
This command is not effective when DIP switch 1-1 is ON.

ESC % ESC/P — Select User-defined Set

Format:

ASCII code:	ESC	%	*n*
Decimal:	27	37	*n*
Hexadecimal:	1B	25	*n*

Comments:

ESC & is required to define the character set. The following values can be used for *n*.
0: Selects the normal set.
1: Selects the user-defined set.

ESC I ESC/P — Printable Code Area Expansion

Format:

ASCII code:	ESC	I	*n*
Decimal:	27	73	*n*
Hexadecimal:	1B	49	*n*

Comments:

The ESC I code makes be printable or non-printable according to the value specified for *n*.
0: Returns 0 to 31 and 128 to 159 to non-printable codes.
1: Allows these codes for user-defined characters.

ESC = IBM — Define User-defined Characters

Format:

ASCII code:	ESC	=	*n1*	*n2*	...	*nk*
Decimal:	27	61	*n1*	*n2*	...	*nk*
Hexadecimal:	1B	3D	*n1*	*n2*	...	*nk*

Comments:

This command allows definition of characters in the user-defined character set.
If C is the total number of characters to be defined,
B = (C × 13) + 2
n1 = B MOD 256
n2 = INT(B/256)
n3 = 20 in all cases
n4 = the code of the first character to be defined
n5 = 0 if the top 8 pins are used; *n5* = 128 for the bottom 8 pins
n6 = 0 in all cases
n7 through *nk* are the data numbers that define the characters, with 11 data numbers for each character
To print a user-defined character, you must use ESC I, which is described on page 10-29.

Graphics

See Chapter 4 for sample graphics programs. See the table under ESC * for graphics modes.

ESC K ESC/P · IBM — Select Single-density Graphics Mode

Format:

ASCII code:	ESC	K	*n1*	*n2*
Decimal:	27	75	*n1*	*n2*
Hexadecimal:	1B	4B	*n1*	*n2*

Comments:

Turns on eight-pin, single-density graphics mode. The total number of columns = *n1* + (*n2* × 256).

ESC L ESC/P · IBM Select Double-density Graphics Mode

Format:

ASCII code:	ESC	L	*n1*	*n2*
Decimal:	27	76	*n1*	*n2*
Hexadecimal:	1B	4C	*n1*	*n2*

Comments:

Turns on eight-pin, low-speed, double-density graphics mode. The total number of columns = $n1 + (n2 \times 256)$.

ESC Y ESC/P · IBM Select High-speed Double-density Graphics Mode

Format:

ASCII code:	ESC	Y	*n1*	*n2*
Decimal:	27	89	*n1*	*n2*
Hexadecimal:	1B	59	*n1*	*n2*

Comments:

Turns on eight-pin, high-speed, double-density graphics mode. The total number of columns = $n1 + (n2 \times 256)$.

ESC Z ESC/P · IBM Select Quadruple-density Graphics Mode

Format:

ASCII code:	ESC	Z	*n1*	*n2*
Decimal:	27	90	*n1*	*n2*
Hexadecimal:	1B	5A	*n1*	*n2*

Comments:

Turns on eight-pin, quadruple-density graphics mode. The total number of columns = $n1 + (n2 \times 256)$.

ESC * ESC/P — Select Graphics Mode

Format:

ASCII code:	ESC	*	*m*	*n1*	*n2*
Decimal:	27	42	*m*	*n1*	*n2*
Hexadecimal:	1B	2A	*m*	*n1*	*n2*

Comments:

Turns on graphics mode *m*. See the table on the next page for details on the available modes. The total number of columns = $n1 + (n2 \times 256)$.

Option	Alternate code	m	Horiz. density (dots/in)
Single-density	ESC K	0	60
Double-density	ESC L	1	120
High-speed double-density*	ESC Y	2	120
Quadruple-density*	ESC Z	3	240
CRT I	none	4	80
Plotter (1:1)	none	5	72
CRT II	none	6	90
Double-density plotter	none	7	144

* Adjacent dots cannot be printed in this mode.

ESC ? ESC/P — Reassign Graphics Mode

Format:

ASCII code:	ESC	?	*s*	*n*
Decimal:	27	63	*s*	*n*
Hexadecimal:	1B	3F	*s*	*n*

Comments:

Changes on graphics mode to another. The variable *s* is a character (K, L, Y or Z), which is reassigned to a mode *n* (0-7).

ESC ^ ESC/P — Select 9-pin Graphics Mode

Format:

ASCII code:	ESC	^	*m*	*n1*	*n2*
Decimal:	27	94	*m*	*n1*	*n2*
Hexadecimal:	1B	5E	*m*	*n1*	*n2*

Comments:

Turns on 9-pin Graphics mode. For this command the variable *m* defines density of print (0 for single and 1 for double). The total number of columns = $n1 + (n2 \times 256)$. This mode requires two data items for each column of print.

Appendix

Proportional Width Table A-2

Character Tables A-6

Proportional Width Table

This table lists the widths of your printer's proportional characters. The values given are in 120ths of an inch. (For example, a value of 12 is 12/120ths of an inch.) You may need to enter these widths into a special table for your processing program so it can calculate the number of proportional characters that will fit on a line.

The characters with no code indicated are international characters or graphics. See the table on page 3-24 for the relevant codes for the international characters. Also, see the descriptions of the ESC R and ESC t commands on page 10-41 for information on how to use these characters.

The following width table shows each character, its ASCII code (hexadecimal), and its width. If there are two numbers in the width column, the second one is for the italic character.

Code	CHR	Width	Code	CHR	Width
20		12/12	30	0	12/12
21	!	5/10	31	1	8/9
22	"	8/10	32	2	12/12
23	#	12/12	33	3	12/12
24	$	12/11	34	4	12/12
25	%	12/12	35	5	12/12
26	&	12/12	36	6	12/11
27	'	5/5	37	7	12/12
28	(	6/8	38	8	12/12
29	)	6/8	39	9	12/11
2A	*	12/12	3A	:	6/8
2B	+	12/12	3B	;	6/9
2C	,	7/8	3C	<	10/10
2D	-	12/12	3D	=	12/11
2E	.	6/7	3E	>	10/9
2F	/	10/10	3F	?	12/11

Code	CHR	Width
40	@	12/12
41	A	12/12
42	B	12/12
43	C	12/12
44	D	12/12
45	E	12/12
46	F	12/12
47	G	12/12
48	H	12/12
49	I	8/10
4A	J	11/12
4B	K	12/12
4C	L	12/10
4D	M	12/12
4E	N	12/12
4F	O	12/12
50	P	12/12
51	Q	12/12
52	R	12/12
53	S	12/12
54	T	12/12
55	U	12/12
56	V	12/11
57	W	12/12
58	X	10/12
59	Y	12/12
5A	Z	10/12
5B	[	8/11
5C	\	10/7
5D	]	8/11
5E	^	12/10
5F	←	12/12
60	`	5/5
61	a	12/11
62	b	11/11
63	c	11/11

Code	CHR	Width
64	d	11/12
65	e	12/11
66	f	10/12
67	g	11/11
68	h	11/11
69	i	8/9
6A	j	9/10
6B	k	10/11
6C	l	8/9
6D	m	12/11
6E	n	11/10
6F	o	12/11
70	p	11/11
71	q	11/11
72	r	11/10
73	s	12/11
74	t	11/10
75	u	12/11
76	v	12/10
77	w	12/12
78	x	10/12
79	y	12/11
7A	z	10/12
7B	{	9/10
7C	¦	5/9
7D	}	9/10
7E	~	12/12
	Ç	12/12
	ü	11/12
	é	12/11
	â	12/12
	ä	12/11
	à	12/11
	å	12/11
	ç	11/11
	ê	12/12

Code	CHR	Width
	ë	12/11
	è	12/11
	ï	8/10
	î	10/11
	ì	8/8
	Ä	12/12
	Å	12/12
	É	12/12
	æ	12/12
	Æ	12/12
	ô	12/12
	ö	10/11
	ò	10/11
	û	11/11
	ù	11/11
	ÿ	12/11
	Ö	12/12
	Ü	12/12
	¢	11/11
	£	12/12
	¥	12/12
	₧	12/12
	ƒ	11/12
	á	12/12
	í	8/10
	ó	10/12
	ú	11/11
	ñ	11/12
	Ñ	12/12
	ª	12/11
	º	12/12
	¿	12/11
	⌐	12/12
	¬	12/12
	½	12/12
	¼	12/12
	¡	5/10

Code	CHR	Width
	«	12/12
	»	12/12
B0	▒	12
B1	▓	12
B2	▓	12
B3	┤	12
B4	┤	12
B5	╡	12
B6	╢	12
B7	╖	12
B8	╕	12
B9	╣	12
BA	║	12
BB	╗	12
BC	╝	12
BD	╜	12
BE	╛	12
BF	┐	12
C0	└	12
C1	┴	12
C2	┬	12
C3	├	12
C4	─	12
C5	┼	12
C6	╞	12
C7	╟	12
C8	╚	12
C9	╔	12
CA	╩	12
CB	╦	12
CC	╠	12
CD	═	12
CE	╬	12
CF	╧	12
D0	╨	12
D1	╤	12
D2	╥	12

Code	CHR	Width
D3	⊾	12
D4	⊩	12
D5	⊪	12
D6	⊫	12
D7	⊬	12
D8	⊭	12
D9	⊮	12
DA	⊯	12
DB	⊰	12
DC	⊱	12
DE	⊲	12
DF	⊳	12
E0	α	12/12
E1	ß	11/11
E2	Γ	10/12
E3	π	12/12
E4	Σ	10/12
E5	σ	11/12
E6	µ	11/12
E7	τ	12/12
E8	Φ	10/12
E9	Θ	12/12
EA	Ω	12/12
EB	δ	12/11
EC	∞	12/12
ED	ø	12/12
EE	∈	10/10
EF	∩	10/12
F0	≡	11
F1	±	11
F2	≥	11
F3	≤	11
F4	⌠	11
F5	⌡	11
F6	÷	11
F7	≈	11

Code	CHR	Width
F8	°	11
F9	∙	11
FA	·	11
FB	√	11
FC	n	11
FD	²	11
FE	■	11
	°	8/8
	¤	12/12
	ß	11/11
	Ø	12/12
	ø	12/12
	··	8/9
	§	10/12
	¥	12/12

Italic character table

Hex. No.	Binary No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Hex. No.	Binary No.	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	NUL 0	16	SP 32	0 48	@ 64	P 80	` 96	p 112	à 128	§ 144	SP 160	*0* 176	*@* 192	*P* 208	` 224	*p* 240
1	0001	1	DC1 17	! 33	1 49	A 65	Q 81	a 97	q 113	è 129	ß 145	*!* 161	*1* 177	*A* 193	*Q* 209	*a* 225	*q* 241
2	0010	2	DC2 18	" 34	2 50	B 66	R 82	b 98	r 114	ù 130	Æ 146	" 162	*2* 178	*B* 194	*R* 210	*b* 226	*r* 242
3	0011	3	DC3 19	# 35	3 51	C 67	S 83	c 99	s 115	ò 131	æ 147	# 163	*3* 179	*C* 195	*S* 211	*c* 227	*s* 243
4	0100	4	DC4 20	$ 36	4 52	D 68	T 84	d 100	t 116	ì 132	ø 148	*$* 164	*4* 180	*D* 196	*T* 212	*d* 228	*t* 244
5	0101	5	21	% 37	5 53	E 69	U 85	e 101	u 117	° 133	Ø 149	*%* 165	*5* 181	*E* 197	*U* 213	*e* 229	*u* 245
6	0110	6	22	& 38	6 54	F 70	V 86	f 102	v 118	£ 134	¨ 150	*&* 166	*6* 182	*F* 198	*V* 214	*f* 230	*v* 246
7	0111	BEL 7	23	´ 39	7 55	G 71	W 87	g 103	w 119	¡ 135	Å 151	´ 167	*7* 183	*G* 199	*W* 215	*g* 231	*w* 247
8	1000	BS 8	CAN 24	(40	8 56	H 72	X 88	h 104	x 120	¿ 136	Ö 152	*(* 168	*8* 184	*H* 200	*X* 216	*h* 232	*x* 248
9	1001	HT 9	EM 25	) 41	9 57	I 73	Y 89	i 105	y 121	Ñ 137	Ü 153	*)* 169	*9* 185	*I* 201	*Y* 217	*i* 233	*y* 249
A	1010	LF 10	26	* 42	: 58	J 74	Z 90	j 106	z 122	ñ 138	ä 154	*** 170	*:* 186	*J* 202	*Z* 218	*j* 234	*z* 250
B	1011	VT 11	ESC 27	+ 43	; 59	K 75	[91	k 107	{ 123	¤ 139	ö 155	*+* 171	*;* 187	*K* 203	*[* 219	*k* 235	*{* 251
C	1100	FF 12	28	, 44	< 60	L 76	\ 92	l 108	¦ 124	Pt 140	ü 156	*,* 172	*<* 188	*L* 204	\ 220	*l* 236	*¦* 252
D	1101	CR 13	29	- 45	= 61	M 77	] 93	m 109	} 125	Å 141	É 157	*-* 173	*=* 189	*M* 205	*]* 221	*m* 237	*}* 253
E	1110	SO 14	30	. 46	> 62	N 78	^ 94	n 110	~ 126	å 142	é 158	*.* 174	*>* 190	*N* 206	^ 222	*n* 238	*~* 254
F	1111	SI 15	31	/ 47	? 63	O 79	_ 95	o 111	DEL 127	ç 143	¥ 159	*/* 175	*?* 191	*O* 207	_ 223	*o* 239	*Ø* 255

Epson extended graphic character table

Hex. No.	Binary No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Hex. No.	Binary No.	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	NUL 0	▪ 16	SP 32	0 48	@ 64	P 80	` 96	p 112	Ç 128	É 144	á 160	▒ 176	└ 192	╨ 208	α 224	≡ 240
1	0001	1	DC1 17	! 33	1 49	A 65	Q 81	a 97	q 113	ü 129	æ 145	í 161	▓ 177	┴ 193	╤ 209	β 225	± 241
2	0010	2	DC2 18	" 34	2 50	B 66	R 82	b 98	r 114	é 130	Æ 146	ó 162	▓ 178	┬ 194	╥ 210	Γ 226	≥ 242
3	0011	3	DC3 19	# 35	3 51	C 67	S 83	c 99	s 115	â 131	ô 147	ú 163	▏ 179	├ 195	╙ 211	π 227	≤ 243
4	0100	4	DC4 20	$ 36	4 52	D 68	T 84	d 100	t 116	ä 132	ö 148	ñ 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	0101	5	21	% 37	5 53	E 69	U 85	e 101	u 117	à 133	ò 149	Ñ 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
6	0110	6	22	& 38	6 54	F 70	V 86	f 102	v 118	å 134	û 150	ª 166	╢ 182	╞ 198	╓ 214	µ 230	÷ 246
7	0111	BEL 7	23	' 39	7 55	G 71	W 87	g 103	w 119	ç 135	ù 151	º 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8	1000	BS 8	CAN 24	(40	8 56	H 72	X 88	h 104	x 120	ê 136	ÿ 152	¿ 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
9	1001	HT 9	EM 25	) 41	9 57	I 73	Y 89	i 105	y 121	ë 137	Ö 153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	• 249
A	1010	LF 10	26	* 42	: 58	J 74	Z 90	j 106	z 122	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B	1011	VT 11	ESC 27	+ 43	; 59	K 75	[91	k 107	{ 123	ï 139	¢ 155	½ 171	╗ 187	╦ 203	■ 219	δ 235	√ 251
C	1100	FF 12	28	, 44	< 60	L 76	¥ 92	l 108	¦ 124	î 140	£ 156	¼ 172	╝ 188	╠ 204	▪ 220	∞ 236	n 252
D	1101	CR 13	29	- 45	= 61	M 77	] 93	m 109	} 125	ì 141	¥ 157	¡ 173	╜ 189	═ 205	▌ 221	ø 237	² 253
E	1110	SO 14	30	. 46	> 62	N 78	^ 94	n 110	~ 126	Ä 142	₧ 158	« 174	╛ 190	╬ 206	▐ 222	∈ 238	■ 254
F	1111	SI 15	31	/ 47	? 63	O 79	_ 95	o 111	DEL 127	Å 143	ƒ 159	» 175	┐ 191	╧ 207	▬ 223	∩ 239	SP 255

Characters in the shaded areas can not be printed unless the ESC 6 command is sent to the printer. Until then, the shaded area contains the same control codes found in the range of 0 to 31 and 127.

IBM emulation mode

The following character tables can be selected in the IBM emulation mode (DIP switch 1-4 ON).

Table 1 and Table 2

When DIP switches 1-6, 1-7 and 1-8 are all ON, Character Table 1 is selected as default; otherwise, Character Table 2 is selected as default. Character sets can also be selected using ESC 6 (to select Table 2) and ESC 7 (to select Table 1).

Table 2 is shown below. Table 1 differs from Table 2 in characters included in the shaded areas. In Table 1, characters for codes 80 to 1F are the same as those for codes 00 to 1F.

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL			0	@	P	`	p	Ç	É	á	▒	└	╙	α	≡
1		DC1	!	1	A	Q	a	q	ü	æ	í	▒	┴	╤	ß	±
2		DC2	"	2	B	R	b	r	é	Æ	ó	▒	┬	╥	Γ	≥
3	♥		#	3	C	S	c	s	â	ô	ú	▒	├	╙	π	≤
4	♦	DC4	$	4	D	T	d	t	ä	ö	ñ	▒	─	╘	Σ	⌠
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	▒	┼	╒	σ	⌡
6	♠		&	6	F	V	f	v	å	û	ª	▒	╞	╓	µ	÷
7	BEL		'	7	G	W	g	w	ç	ù	º	▒	╟	╫	τ	≈
8	BS	CAN	(	8	H	X	h	x	ê	ÿ	¿	▒	╚	╪	Φ	°
9	HT		)	9	I	Y	i	y	ë	Ö	⌐	▒	╔	┘	Θ	•
A	LF		*	:	J	Z	j	z	è	Ü	¬	▒	╩	┌	Ω	·
B	VT	ESC	+	;	K	[	k	{	ï	¢	½	▒	╦	▒	δ	√
C	FF		,	<	L	\	l	¦	î	£	¼	▒	╠	▒	∞	n
D	CR		-	=	M	]	m	}	ì	¥	¡	▒	═	▒	ø	²
E	SO		.	>	N	^	n	~	Ä	Pt	«	▒	╬	▒	∈	■
F	SI		/	?	O	_	o	⌂	Å	f	»	▒	╧	▒	∩	

Symbol set

In the IBM emulation mode, the symbol set in which all codes are printable can be used. To print symbol characters, use ESC ¥ or ESC ^ (see pages 10-42 and 10-43).

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	Ø	►		0	@	P	`	p	Ç	É	á	⣿	└	╙	α	≡
1	☺	◄	!	1	A	Q	a	q	ü	æ	í	▒	┴	╤	ß	±
2	☻	↕	"	2	B	R	b	r	é	Æ	ó	▓	┬	╥	Γ	≥
3	♥	‼	#	3	C	S	c	s	â	ô	ú	┃	├	╙	π	≤
4	♦	¶	$	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ	⌠
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
6	♠	▬	&	6	F	V	f	v	å	û	ª	╢	╞	╓	µ	÷
7	•	↨	'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
8	◘	↑	(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°
9	○	↓	)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	Θ	•
A	◙	→	*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
B	♂	←	+	;	K	[	k	{	ï	¢	½	╗	╦	▉	δ	√
C	♀	∟	,	<	L	\	l	¦	î	£	¼	╝	╠	▬	∞	ⁿ
D	♪	↔	-	=	M	]	m	}	ì	¥	¡	╜	═	▌	ø	²
E	♫	▲	.	>	N	^	n	~	Ä	₧	«	╛	╬	▐	∈	■
F	☼	Ø	/	?	O		o	⌂	Å	f	»	┐	╧	▀	∩	

Note that these definitions apply specifically to printers. If a word is italicized, see that topic for more information.

application program
A program that helps you carry out a particular task, such as word processing or financial planning.

ASCII
American Standard Code for Information Interchange. Pronounced ass-key. A standardized coding system for assigning numerical codes to letters and symbols.

auto line feed
When this feature is enabled using a DIP switch, each carriage return code (CR) is automatically accompanied by a line feed (LF) code.

baud rate
Pronounced bow-rate. A measure of the speed of data transmission. Usually given in bits per second.

bidirectional printing
Printing in which the print head travels from left to right only on every other line. On the other lines, it travels from right to left. Because the head prints in both directions, this increases the overall printing speed by increasing the number of lines that the head prints per minute.

binary
See *number systems.*

bit
A binary digit (0 or 1), which is the smallest unit of information used by a printer or computer. See also *number systems.*

buffer
See *memory.*

byte
A unit of information consisting of eight bits.

carriage return
The control code that returns the print position to the left margin. When issued together with a line feed, the print position moves to the left margin of the next line. In bidirectional printing, the print head may not actually move to the left margin.

character set
A collection of letters, numbers and symbols that provides you with the characters used in a particular language.

condensed
Printing in which each character is approximately 60% of the width of standard characters. For example, condensed 10 pitch has 17 characters per inch (cpi). Useful for fitting wide tables or spreadsheets onto the paper.

continuous paper
Paper which has sprocket-feed holes on each side, is perforated between pages, and is supplied in a folded stack. Also called fanfold paper.

control code
In addition to the codes for printable characters, the ASCII standard also includes 33 other codes which are called control codes. These control codes perform such functions as sounding the beeper and performing a carriage return or line feed.

cut sheet feeder (CSF)
An optional, detachable device which automatically feeds single sheets of paper or envelopes into the printer.

data dump
Sometimes called hex dump. A troubleshooting feature. When the printer is in the data dump mode, each code that it receives is printed in hexadecimal notation as well as in the ASCII codes that stand for the characters.

decimal
See *number systems*.

default
A value or setting that takes effect when the equipment is turned on, reset, or initialized.

DIP switches
Small switches in a printer that control various printer functions and set the default status of the printer when it is turned on or initialized. DIP stands for Dual In-line Package.

dot graphics
A graphic design formed by patterns of dots.

dot matrix
A method of printing in which each letter or symbol is formed by a pattern (matrix) of individual dots.

double-height printing
Printing in which each character is twice as high as normal.

double-strike printing
A way of producing bolder characters. Each character is printed twice in a single pass of the print head; the second time, the dots are printed slightly below the original dots. Can only be used in draft mode.

double-width printing
A print width in which each character is twice as wide as normal characters.

draft (normal printing)
One of three print qualities available on your printer. Draft is printed with reduced number of dots per character to improve the printing speed. See also *Near Letter Quality* and *high speed draft*.

emphasized printing
A way of producing darker characters. Each character of a line is printed in two passes of the print head; the second time, the dots are printed slightly to the right of the original dots.

Epson ESC/P
Abbreviation for Epson Standard Code for Printers. The system of commands lets you perform software control of your printer from your computer. It is standard for all Epson printers and supported by most applications software for personal computers.

Epson Extended Graphics character table
The Epson Extended Graphics character table contains international accented characters, Greek characters, and character graphics for printing lines, corners, and shaded areas.

ESC (escape)
A special control code used to begin most printer commands.

font
A font is a style of type designated by a family name.

form
In printer terminology, this term normally refers to the equivalent of a page.

form feed
Refers to both a control code and a panel button that advances the paper to the top of the next page.

hexadecimal (hex)
See *number system.*

high speed draft
One of three print qualities available on your printer. High speed draft uses a minimum number of dots per character for high speed printing. See also *draft* and *Near Letter Quality.*

initialize
To establish the initial default status of the printer by turning the printer on or by sending an $\overline{\text{INIT}}$ signal.

input buffer
The memory in the printer in which data sent from the computer is stored while waiting to be printed.

interface
See *parallel interface* and *serial interface.*

italic
A typestyle in which the characters slant. *This sentence is italicized.*

line feed
Both a control code and a panel button that advances the paper one line space.

loading position
The position which the paper is automatically loaded. It can be adjusted by using the micro adjustment feature.

memory
The printer, like a computer, has a memory. When you print a file from a computer, the contents of the file are transferred quickly from the computer's memory to the printer's memory. The printer then prints information from its own memory at a much slower rate. This way of printing frees the computer to do other work while the printer is still working. The printer memory is sometimes called the buffer memory or input buffer.

micro adjustment
A feature that adjusts the paper loading and short tear-off positions.

Near Letter Quality
One of three print qualities available on your printer. Near Letter Quality reduces the print speed and increases the number of dots per character to increase the print quality. See also *draft* and *high speed draft.*

number systems
Three number systems are commonly used with printers:

decimal is base 10 and uses the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9. (This is the most familiar system.)

hexadecimal (hex) is base 16 and uses the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, and F. This is frequently used by programmers. Any decimal number between 0 and 255 can be expressed by a two-digit hex number.

binary is base 2 and uses only the digits 0 and 1. All information in computer systems is handled in binary form to represent electrical signals that are ON or OFF. A binary digit is often called a bit; any decimal number between 0 and 255 can be expressed by an eight-bit decimal number.

on line
When the printer is on line, it is in communication with the computer connected to it.

paper-out sensor
A small switch behind the platen that sends a signal when it is not in contact with paper, causing the PAPER OUT light to go on.

paper tension unit
The part of the printer that fits on top of the platen to assure proper paper-feed tension.

parallel interface
An interface that connects the computer and the printer. There are two types: a parallel interface transmits data one character or code at a time, while the serial interface transmits data one bit at a time.

platen
The black roller that provides a back support for the paper during the printing.

print quality
Your printer has two types of print quality; draft and Near Letter Quality. Draft is for high-speed, draft quality jobs; Near Letter Quality is used to produce more polished documents.

proportional printing
Printing in which the character width varies from character to character. For example, a capital W receives much more space than a lower case i. The result looks more like a typeset book than a typewritten draft.

pull tractor unit
An optional device that moves continuous paper through the printer.

RAM
Random Access Memory. The portion of the printer's memory used as a buffer and as a place for storing user-defined characters.

reset
To return a printer to its defaults, either by a command, an $\overline{\text{INIT}}$ signal, or by turning the printer off and on.

self test
A method of checking the operation of the printer. When the self test is run, the printer prints out its current DIP switch settings and the characters that are stored in its ROM (Read Only Memory).

serial interface
An interface is the connection between the computer and the printer. There are two types; a parallel interface transmits data one character or code at a time (in bytes), while the serial interface transmits data one bit at a time.

short tear-off
A feature that automatically feed the perforation of continuous paper to the tear-off position and then feeds the paper back to the loading position. This position can be adjusted by using the micro adjustment feature. See *micro adjustment*.

10 pitch
A pitch with 10 characters per inch. This is often the standard or default pitch. Also referred to as pica.

tractor
The part of the printer that moves continuous paper through the printer.

12 pitch
A pitch in which each character is slightly narrower than normal, so that there are 12 characters per inch across the page. Also referred to as elite.

user-defined characters
Characters that are defined and stored in the printer by the user. Also known as download characters.

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Quick Reference

EPSON

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DIP Switch Settings

DIP Switch 1

Switch	Description	ON	OFF
1-1	Default character set	User-defined	ROM
1-2	Shape of zero	Slashed	Not slashed
1-3	Table select	Graphic	Italic
1-4	Protocol mode	IBM emulation	ESC/P
1-5	Short tear-off mode	Invalid	Valid
1-6 1-7 1-8	International character set	See the table below	

DIP Switch 2

Switch	Description	ON	OFF
2-1	Page length	12 inches	11 inches
2-2	Cut sheet feeder mode	ON	OFF
2-3	1-inch skip over perforation	ON	OFF
2-4	Auto line feed	ON	OFF

International character set selection

SW1-6	SW1-7	SW1-8	Counry
ON	ON	ON	U.S.A.
ON	ON	OFF	France
ON	OFF	ON	Germany
ON	OFF	OFF	U.K.
OFF	ON	ON	Denmark
OFF	ON	OFF	Sweden
OFF	OFF	ON	Italy
OFF	OFF	OFF	Spain

Commands by Function

Word Processing

Code	Dec.	Hex.	Description	ESC/P	IBM
ESC a	97	61	Select Justification	10-40	
ESC SP	32	20	Set Intercharacter Space	10-40	

Character Tables

ESC t	116	74	Select Character Table	10-41	
ESC R	82	52	Select an International Character Set	10-41	
ESC 6	54	36	Enable Printable Characters	10-42	10-42
ESC 7	55	37	Enable Upper Control Codes	10-42	10-42
ESC \	92	5C	Print Characters from Symbol Set		10-42
ESC ^	94	5E	Print One Character from Symbol Set		10-43

User-defined Characters

ESC &	38	26	Define User-defined Characters	10-43	
ESC :	58	3A	Copy ROM to RAM	10-43	
ESC %	37	25	Select User-defined Set	10-44	
ESC I	73	49	Printable Code Area Expansion	10-44	
ESC =	61	3D	Define User-defined Characters		10-45

Graphics

ESC K	75	4B	Select Single-density Graphics Mode	10-45	10-45
ESC L	76	4C	Select Double-density Graphics Mode	10-46	10-46
ESC Y	89	59	Select High-speed Double-density Graphics Mode	10-46	10-46
ESC Z	90	5A	Select Quadruple-density Graphics Mode	10-46	10-46
ESC *	42	2A	Select Graphics Mode	10-47	
ESC ?	63	3F	Reassign Graphics Mode	10-47	
ESC ^	94	5E	Select 9-pin Graphics Mode	10-48	

Commands by Function

The following list of commands is in the order used in the command summary (Chapter 10). To find details on the command you want to use, refer to the page number in the column for your operating mode — Epson ESC/P or IBM emulation mode.

Printer Operation

Code	Dec.	Hex.	Description	ESC/P	IBM
ESC @	64	40	Initialize Printer	10-10	
DC1	17	11	Select Printer	10-10	10-10
DC3	19	13	Deselect Printer	10-11	
ESC Q	81	51	Deselect Printer		10-11
ESC s	115	73	Turn Half-speed Mode On/Off	10-11	
ESC <	60	3C	Select Unidirectional Mode (one line)	10-12	
ESC U	85	55	Turn Unidirectional Mode On/Off	10-12	10-12
ESC 8	56	38	Disable Paper Out Detection	10-13	
ESC 9	57	39	Enable Paper Out Detection	10-13	
ESC EM	25	19	Turn Cut Sheet Feeder Mode On/Off	10-13	
ESC =	61	3D	Set MSB to 0	10-14	
ESC >	62	3E	Set MSB to 1	10-14	
ESC #	35	23	Cancel MSB Control	10-14	
BEL	7	07	Beeper	10-15	10-15

Data Control

CR	13	0D	Carriage Return	10-15	10-15
CAN	24	18	Cancel Line	10-15	10-15
DEL	127	7F	Delete Character	10-15	

Vertical Motion

FF	12	0C	Form Feed	10-16	10-16
ESC C	67	43	Set Page Length in Lines	10-16	10-16
ESC C0	67	43	Set Page Length in Inches	10-17	10-17
ESC N	78	4E	Set Skip Over Perforation	10-17	10-17
ESC O	79	4F	Cancel Skip Over Perforation	10-17	10-17
ESC 4	52	34	Set Top of Form		10-18
LF	10	0A	Line Feed	10-18	10-18
ESC 0	48	30	Select 1/8-inch Line Spacing	10-18	
ESC 1	49	31	Select 7/72-inch Line Spacing	10-19	10-19
ESC 2	50	32	Select 1/6-inch Line Spacing	10-19	
ESC 2	50	32	Select ESC A Line Spacing		10-19
ESC 3	51	33	Set *n*/216-inch Line Spacing	10-20	10-20
ESC A	65	41	Set *n*/72-inch Line Spacing	10-20	
ESC A	65	41	Set *n*/72-inch Line Spacing		10-20
ESC J	74	4A	Perform *n*/216-inch Line Feed	10-21	10-21
ESC 5	53	35	Set/Reset Automatic Line Feeds		10-21
VT	11	0B	Tab Vertically	10-22	10-22
ESC B	66	42	Set Vertical Tabs	10-22	10-22
ESC b	98	62	Set Vertical Tabs in Channels	10-22	
ESC /	47	2F	Select Vertical Tab Channel	10-23	

Horizontal Motion

Code	Dec.	Hex.	Description	ESC/P	IBM
ESC l	108	6C	Set Left Margin	10-23	
ESC Q	81	51	Set Right Margin	10-24	
ESC X	88	58	Set Left and Right Margins		10-24
BS	8	08	Backspace	10-25	10-25
ESC $	36	24	Set Absolute Print Position	10-25	
ESC \	92	5C	Set Relative Print Position	10-26	
HT	9	09	Tab Horizontally	10-26	10-26
ESC D	68	44	Set Horizontal Tabs	10-27	10-27
ESC R	82	52	Reset all Tabs		10-27

Overall Printing Style

ESC x	120	78	Select Near Letter Quality or Draft	10-28	
ESC k	107	6B	Select Typestyle Family	10-28	
ESC !	33	21	Master Select	10-29	
ESC I	73	49	Select Font		10-29

Character Pitch and Size

ESC P	80	50	Select 10 pitch	10-30	
ESC M	77	4D	Select 12 pitch	10-30	
DC2	18	12	Select 10 pitch		10-30
ESC :	58	3A	Select 12 pitch		10-31
ESC p	112	70	Turn Proportional Mode On/Off	10-31	
ESC P	80	50	Turn Proportional Mode On/Off		10-32
SI	15	0F	Select Condensed Mode	10-32	10-32
ESC SI	15	0F	Select Condensed Mode	10-33	10-33
DC2	18	12	Cancel Condensed Mode	10-33	
SO	14	0E	Select Double-width Mode(one line)	10-33	10-33
ESC SO	14	0E	Select Double-width Mode(one line)	10-34	10-34
DC4	20	14	Cancel Double-width Mode(one line)	10-34	10-34
ESC W	87	57	Turn Double-width Mode On/Off	10-34	10-34
ESC w	119	77	Turn Double-height Mode On/Off	10-35	
ESC [@	91	5B	Double-height, Double-width		10-35

Print Enhancement

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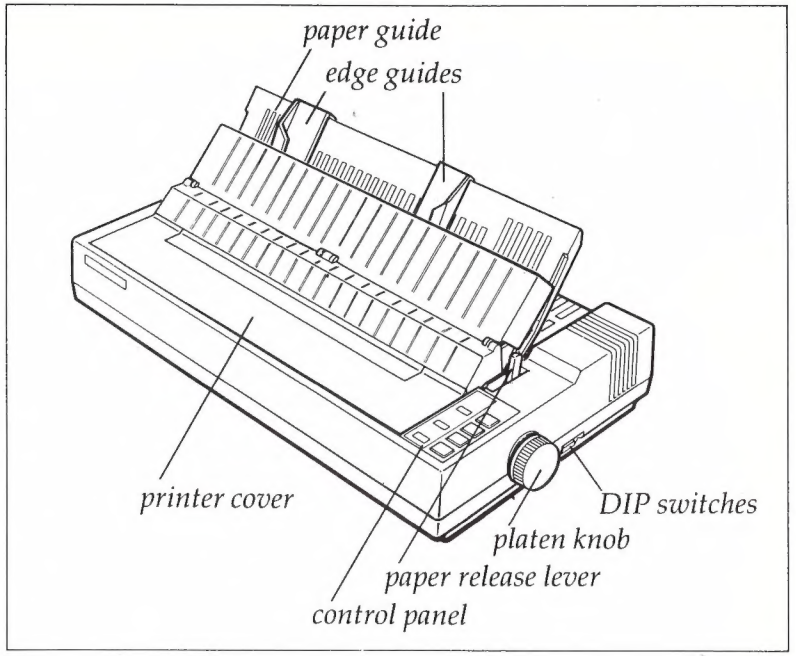

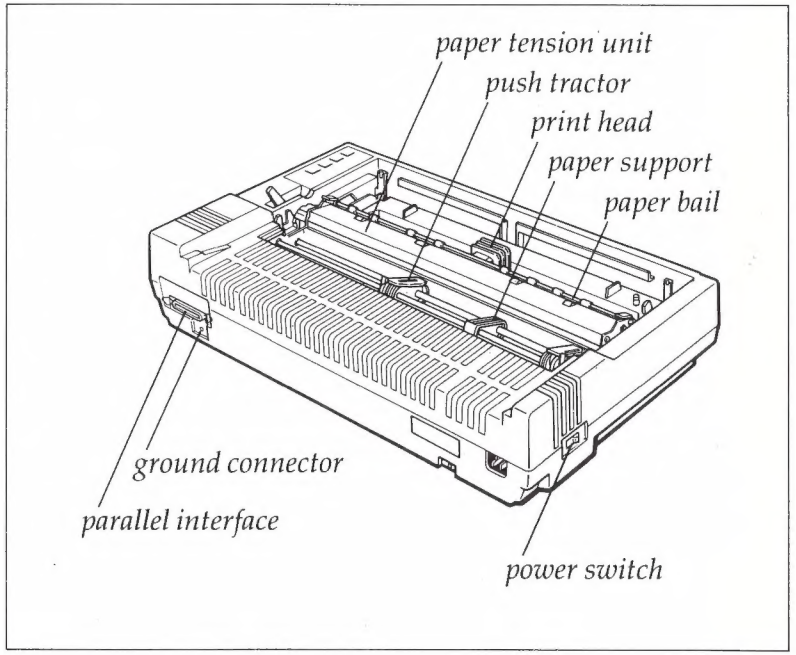

FX-850/1050

User's Guide FX-850/1050 EPSON

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User's Guide

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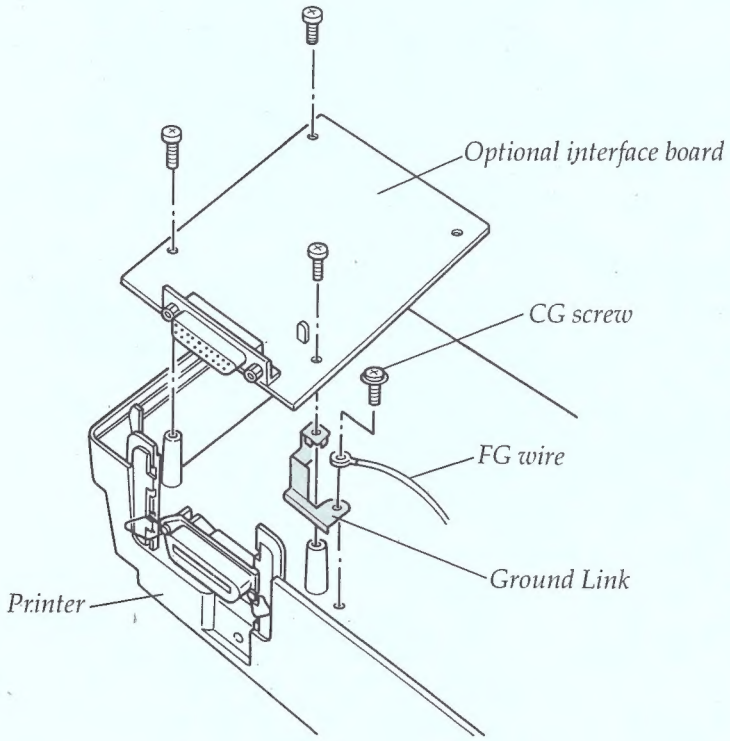
NOTICE

A small metal connector called a ground link is attached to the CG ground. Keep the link in place when you install the board.

Use the CG screw to attach the round end of the FG (frame ground) wire to the main board and the ground link.



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